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Birds of the Twin Islands, James Bay, N.W.T., Canada

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Abstract

North and South Twin Islands are situated near the centre of James Bay, N.W.T.. North Twin Island rises to about 60 m and has an area of about 150 km^2 of which about 35 km^2 are occupied by lakes. South Twin Island is lower and a little more than half the size. Both Islands are composed of unconsolidated sand and gravel and have similar vegetation. There are areas of marsh land, tussock tundra, sand dunes, and gravel ridges. Dwarf Birch (Betula glandulosa) covers about 20 km^2 of North Twin Island and grows up to 1 m high. In sheltered places willows (Salix spp.) grow up to 3 m high. There are widely scattered White Spruce (Picea glauca) up to 6 m high and on North Twin Island one group of about 20.

A few notes on the birds were made during other work on South Twin Island between 26 July and 14 August 1970 and on North Twin Island between 16 September and 18 October 1972. In the latter period 54 bird skins were collected for the Royal Ontario Museum, Toronto. The main ornithological work was done in 1973 between 7 May and 29 July when 156 specimens were collected for the National Museum of Natural Sciences, Ottawa, and estimates made of the size of the breeding population of each species. Published and unpublished notes by other observers are included and give a total of 110 species recorded on one or both of the islands. Many of these species appear to be strays from the forested country, east and west of James Bay, or in some cases from further south. Other species were passing migrants or non-breeding summer residents. Thirty-four species are believed to nest on the islands and for two of these, the Purple Sandpiper (Calidris maritima) and the Dunlin (C. alpina), the islands form the southern limit of their known breeding range.

Résumé

Les îles Jumelles Nord et Sud sont situées presque au centre de la baie James, dans les Territoires du Nord-Ouest. L'île Jumelle Nord a une élévation maximum d'environ 60 m et une superficie d'approximativement 150 km^2 dont quelque 35 km^2 sont occupés par des lacs. L'île Jumelle Sud est moins élevée et presque deux fois moins grande. Ces deux îles sont formées de sable et de gravier et supportent des végétations semblables. On y trouve des terrains marécageux, de la toundra à tertres, des dunes de sable et des crêtes de gravier. Le Bouleau nain (Betula glandulosa) couvre environ 20 km^2 de l'île Jumelle Nord et croît jusqu'à une hauteur d'un mètre; aux endroits abrités, des saules (Salix spp.) atteignent une hauteur de 3 mètres. On rencontre quelques Epinettes blanches (Picea glauca) très clairsemées qui atteignent 6 m de hauteur; un groupe dans l'île Jumelle Nord compte une vingtaine d'arbres.

Entre le 26 juillet et le 14 août 1970 l'auteur, travaillant alors à un autre projet dans l'île Jumelle Sud, put prendre des notes sur son avifaune et, de même, dans l'île Jumelle Nord, du 16 septembre au 18 octobre 1972. A cette dernière occasion 54 spécimens d'oiseaux furent récoltés pour le Royal Ontario Museum de Toronto. Le principal travail ornithologique fut réalisé du 7 mai au 29 juillet 1973 alors que 156 spécimens furent recueillis pour le Musée national des sciences naturelles à Ottawa; la population nicheuse de chaque espèce put alors être estimée. En consultant les notes et les publications d'autres observateurs on a pu consigner un total de 110 espèces dans l'une ou l'autre de ces îles. Plusieurs de ces espèces sont accidentelles et proviennent des régions boisées situées de part et d'autre de la baie James ou, dans certains cas, de régions beaucoup plus au sud. D'autres espèces sont migratrices ou résidentes d'été, mais non-nicheuses. Trente-quatre espèces se reproduisent dans ces îles et dans le cas de Bécasseau maritime (Calidris maritima) et du Bécasseau variable (C. alpina) les îles Jumelles constituent la limite méridionale connue de leur aire de nidification.

Acknowledgements

The 1970, 1972 and 1973 field work, reported here, was done under contract with the Canadian Wildlife Service in conjunction with Polar Bear tagging and observation programmes. I am particularly grateful to C.J. Jonkel and S.G. Curtis for arranging the contracts and organizing transportation to and from the Twin Islands. In all three years I was assisted by Brenda Carter, whose quick recognition of birds and their songs was instrumental in securing many of the records and specimens of the rarer species. I am also indebted to the Government of the Northwest Territories for permission to collect non-migratory birds and to Brian Knudsen and D.H. Baldwin for use of their field notes, and to Henri Ouellet for his interest and assistance.

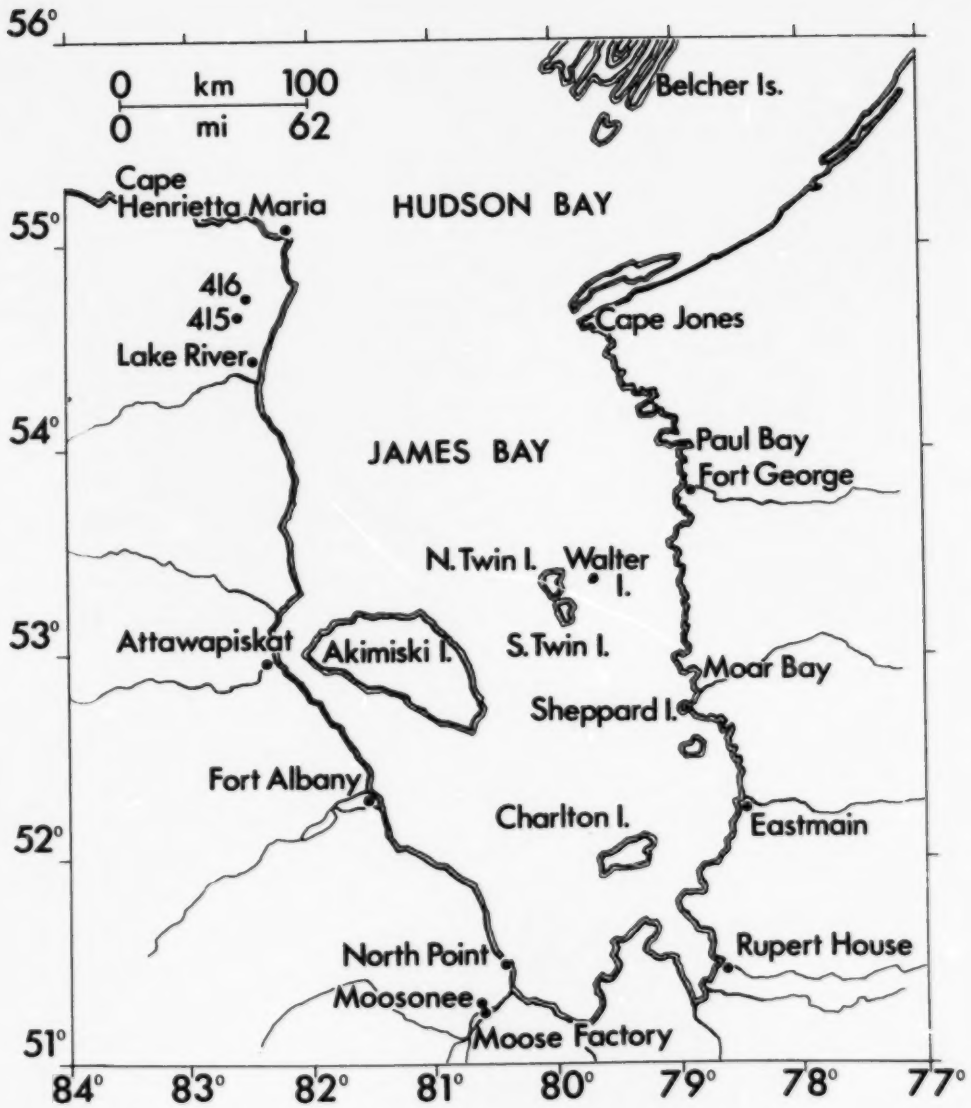

Figure 1. Map of James Bay, Northwest Territories.

Introduction

The first zoological work done on the Twin Islands was the collection of 16 bird skins, now in the National Museum of Natural Sciences (NMNS), from South Twin Island by Frits Johansen between 18 and 27 July 1920. In 1935, R.L. Fricke, accompanied by J.K. Doutt and M.T. Doutt, collected 67 birds from South Twin Island for the Carnegie Museum in Pittsburgh between 20 July and 5 August, and 9 birds on North Twin Island between 30 July and 1 August (figures from list supplied by Carnegie Museum to C.J. Jonkel). Fricke's notes have not been published, but extracts from them are given by Todd (1963). Fricke also visited South Twin Island briefly in 1936 on his way to the Belcher Islands (Todd 1963). In 1938, J.K. Doutt and A.C. Twomey visited South Twin Island on 8 and 9 September (Todd 1963). D.F. Coates was on North Twin Island from 19 to 21 July 1947 (Manning and Coates 1952). Between 12 and 25 July 1968, C.J. Jonkel and Brian Knudsen erected two small cabins near the head of 'Only' Bay (Fig. 2) on North Twin Island for use during the Canadian Wildlife Service's Polar Bear studies. They prepared a list (MS in NMNS files) of the species seen and recorded their population status as common, occasional or rare. In the summers of 1969 and 1970, Knudsen (1978) studied Polar Bears on North Twin Island. He was also on North Twin Island during the summer of 1971, and he and R.H. Russell (pers. comm.) returned to the island on 12 November and remained there until 5 January 1972. Unfortunately, Knudsen (MS) kept notes on the birds only in 1969. From 21 July to 3 August of that year he kept a daily record of the number of individuals of all species seen. During the rest of the summer he noted only a few of the rarer species. In the summer of 1972, D.H. Baldwin and three assistants banded Canada Geese on North Twin Island between 13 and 30 July and on South Twin Island between 24 and 26 July. Baldwin also kept a diary (Baldwin MS) with notes on the birds seen.

I first saw the Twin Islands in 1949, when I landed for a few hours on the east side of South Twin Island on 18 July. Between 1968 and 1973, I frequently visited both islands by helicopter, while tagging Polar Bears in late March and early April, but the only birds I recall seeing were Willow Ptarmigan. Summer visits were made in 1970, 1972 and 1973, when I was accompanied by Brenda Carter. In 1970, we were held up by bad weather on North Twin Island for a few days in late July and August and stayed on South Twin Island from 26 July to 14 August. In 1972, we were on North Twin Island from 16 September to 18 October and in 1973 from 7 May until 29 July. In 1970, we had little time for ornithology, no specimens were collected, and only brief notes made. In 1972, the breeding season was long over when we reached North Twin Island and we were again mainly occupied in tagging Polar Bears; 54 bird skins, now in the Royal Ontario Museum, Toronto, were, however, collected. The work, which forms the basis of this report, was done in 1973, when 156 specimens were collected for the National Museum of Natural Sciences and an attempt made to estimate the breeding populations of North Twin Island. Unless otherwise stated, all sight records and

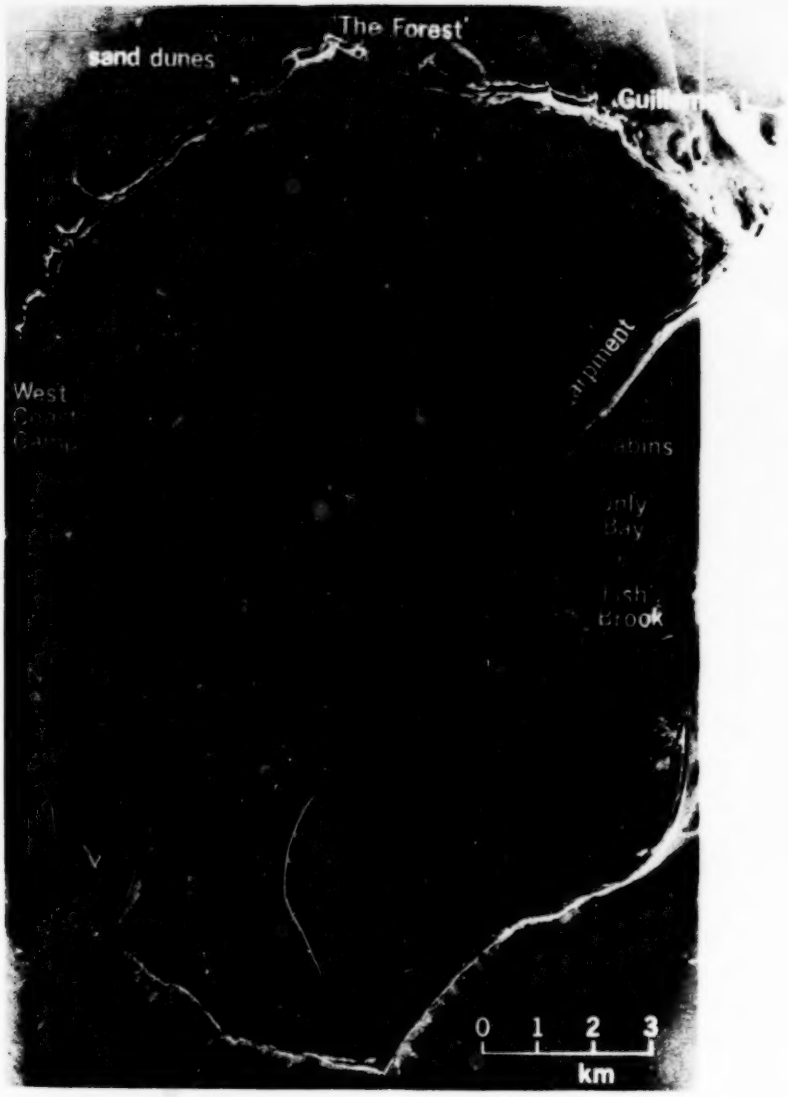

Figure 2. North Twin Island from the air. Original photos A16340-38, A16340-49, and A16340-51 supplied by Surveys and Mapping Branch, Department of Energy, Mines and Resources.

counts are mine. Carter did not keep separate records, but I made notes of her more interesting observations each evening and these are given under her name. Coates' 1947 and my 1949 data as well as Johansen's specimens are recorded in Manning and Coates (1952) and I have referred to them here only when they add significantly to the other records. As references to any particular area are difficult to find in Todd (1963), I have repeated all those I could discover for the Twin Islands. Unless otherwise stated they originate with Fricke and refer to the dates given above for his 1935 stay on the islands. I have summarized Knudsen's 1969 data in much the same way as my own. I have also done this as far as possible with Baldwin's 1972 notes and he has kindly checked them over. For some species, mainly small, common birds, his data were insufficient and have been omitted.

Subspecies

Subspecies are discussed only in isolated instances where such discussion appeared useful.

Population Estimates, Number of Birds Seen and Areas Covered

The number given in the Systematic List for the 'estimated population' of a species refers to the number of individuals believed resident on North Twin Island during the breeding season. The figures are based mainly on the number recorded by me (given as 'number of observations') during 251 h of timed walks and rides on a three-wheeled Honda in 1973. As the same bird may have been seen several times, the number of observations for the more conspicuous species may be greater than the estimated population. Although more territory was covered with the Honda, it appeared that, owing to the dense ground cover in many areas, about the same number of birds were seen per hour as when walking. An exception was along the beaches and a few other open places with short vegetation. Allowance has been made for this in estimating populations. The varied habitats, the comparatively heavy cover and the difficulty of getting through some of the dwarf birch, both with the Honda and on foot, have made some of the population estimates less accurate than similar ones made in areas farther north. Nonetheless, I think they give a better idea of absolute and relative numbers than the use of descriptive terms. On 24 and 25 July we circled the island and estimated the number of each species on the beaches and tide flats. The numbers actually seen on these days were not recorded and are therefore not included in the figures giving the number of observations.

Our base camp in 1972 and 1973 was at the Canadian Wildlife Service's cabins near the head of 'Only' Bay (Fig. 2). In 1973, most time was spent in the region extending about 6 km to the south of the cabins and 5 km to the north and west. Longer trips to the north and south coasts, both overland and round the shore, were fairly frequent. We established

a subsidiary camp on the west coast and occupied it between the following dates: 14-17 June, 29 June - 1 July, 9-11, 20-21 and 24-25 July. We also camped at 'The Forest' (Fig. 2) from 4 to 7 and 13-14 June. On the first occasion it was attracting numerous migrants and vagrants; on the second it was almost deserted.

Except for Willow Ptarmigan, I have made no attempt to estimate the total population of any species on North Twin Island in 1972. Instead I give the number of birds seen at different periods to indicate the apparent variations that occurred during our stay. That year, 51 h were spent along the shore and 21 h inland. Of this time, 39 h on the shore and 7 h inland were on a two-wheeled Honda. Owing to the greater speed when riding, about four times as many birds were seen per hour along the shore as were seen when walking, but inland there was little difference. Most of the shore observations were made on the east coast over a distance of about 25 km from the south point of 'Only' Bay (Fig. 2) to the extreme north point of the island. The west coast was visited only on October 6 when I circled the island. Not many birds were seen there, perhaps because I could not travel on the mud with the motorcycle and had to keep a little inland. Most of the shorebirds seen in 1972 were on the sandy shore of 'Only' Bay.

In 1970 our camp on South Twin Island was on the west coast about 3 km from the north point. Between 8 and 11 August we circled the island by canoe.

Phenology

1973

7 May. Land a quarter snow free. Flood ice caused by seepage and underground drainage almost a metre thick in many places along the east coast and inland below 'Mordor' Escarpment (Fig. 2).

16 May. Land half snow free. First Purple Saxifrage (Saxifraga oppositifolia) in flower. First Canada Goose nests found; nearly full clutches.

19 May. Very little snow left, except in gullies and under the escarpments. Large lakes still ice covered, but small ones, up to 200 m across, nearly ice free.

30 May. Open water along the shore at high tide. Small leaves on some willows.

2 June. Ice starting to move out from 'Only' Bay.

16 June. First mosquitoes.

18 June. Mosquitoes troublesome for the first time.

24 June. Last frost. Only scattered ice left to the east of 'Only' Bay.

1 July. Still scattered ice off west coast.

21 July. Last patches of snow gone from under 'Mordor' Escarpment.

1972

13 July. Just enough open water in 'Only' Bay for the Canso aircraft to land (Baldwin MS).

14 July. Night frost (Baldwin MS).

Figure 3. One of the largest spruce trees on North Twin Island. Dwarf birch and some low willow is growing around it. Photo by Brenda Carter.

22 September. Snow flurries.
10 October. Below freezing most of morning.
12 October. Ground partly frozen and snow covered.
15 October. Ice on small lakes.

The Country

North Twin Island. North Twin Island has an area of about 150 km^2, of which some 35 km^2 are occupied by lakes. The island which rises to about 60 m is composed of unconsolidated sand, silt, gravel, pebbles and small, or occasionally large, boulders. In general the west side of the island is more bouldery than the east. Old wave-cut escarpments, sometimes 2 km inland from the present shoreline, are an important feature of all coasts except the west. The only active erosion at present is near the south-east point. 'Mordor' is the highest and one of the steepest escarpments. It gives good shelter from north-west winds and the Dwarf Birch (Betula glandulosa) and willows (Salix spp.), that grow below it, were a favourite haunt of warblers and other woodland species in 1973. Willows up to 3 m high grow in other sheltered places as well as around many of the lakes

Figure 4. A patch of tall willow on North Twin Island. In the distance is a typical spruce clump. Photo by Brenda Carter.

and along some of the brooks. The total area covered by tall willows, is, however, only about 3 km^2. Willow thickets were particularly important to the White-crowned Sparrow (Zonotrichia leucophrys) and to a lesser degree, to the Tree Sparrow (Spizella arborea). Dwarf Birch, which covers about 20 km^2, tends to follow the escarpments and ridges, growing both above and below them, and thus forming a partial ring round the island with fingers stretching inland along the dryer ground. In some places, the birch covers large areas with a dense mat nearly a metre high. In other areas, strips of gravel often covered by Caribou Lichen (Cladonia sp.) run amongst the birch and give convenient access. Horned Larks (Eremophila alpestris) were sometimes seen on these strips and Savannah Sparrows (Passerculus sandwichensis) lived amongst the birch. White-crowned Sparrows and Tree Sparrows were seen less often in the birch, and in general, bird life was rather scarce there. White Spruce (Picea glauca) up to about 6 m high are scattered over the island either as single trees, often forming a low, dense mat from which several upright trunks arise, or as clusters of 2 or 3 trees. About 50 of these spruce are large enough to attract sparrows, thrushes and warblers in the spring, but later most birds desert them for the willow thickets. Droppings and white feathers showed that the spruce had also given shelter to ptarmigan in early spring. One kilometer south-west of the north point, 20 spruce, growing close together, cover about 200 m^2. This cluster we called 'The Forest' (Fig. 2) and many of the rarer spring migrants were seen there during a strong southerly

Figure 5. Our camp in 'The Forest' on 6 June 1973. In the foreground are the remains of winter snow drifts collected by the trees. Photo by Brenda Carter.

wind between 5 and 7 June.

There are three main areas of marshland. The largest extending south-west from the cabins, covers about 5 km^2. The other two are respectively 2½ km west and 4 km north of the cabins. Sand dunes occur along about half the coastline. These dunes attracted few birds, but inland from them there is often a strip of smooth Dryas - covered ground which was a favourite haunt of Horned Larks, particularly in the spring. There are also three major dune areas (Fig. 2). One is 1½ km inland from the centre of the west coast, another 2 km west-southwest of the north point, and a third near the highest point of 'Mordor' Escarpment. The remainder of the country is a mixture of the above types, and of tussock tundra. In 1973 many species of birds, particularly ducks, were more plentiful on the west side of the island where this mixed terrain predominates. Nesting sandpipers and Semipalmated Plovers favoured a strip of relatively birch free country about 5 km long and 1½ km wide bordering the centre of the west coast. Migrants were attracted to this section of the shoreline, as well as to the south-west coast, by the wide mud and boulder tidal flats, which contrast with the sandy shoreline of the eastern side of the island and the pebble beaches of the north coast.

South Twin Island. South Twin Island is a little more than half the size of North Twin. It is composed of similar unconsolidated material and supports similar vegetation, but

Figure 6. Sand dunes near the north coast of North Twin Island with pack ice in the background. Photo by Brenda Carter.

there is rather less spruce and nothing resembling 'The Forest' of North Twin. There is also less dwarf birch and more mossy tundra on South Twin. The lakes are just as plentiful but smaller than those on North Twin and the escarpments are lower. There seems to be no reason why birds that occur on one island should not do so on the other.

Systematic List

Common Loon, Gavia immer

North Twin Island. Estimated population 12. Breeds. Twenty-one observations in 1973. First seen on 16 May. On 7 July, I found a nest, at the edge of a small lake, containing 1 dead and 1 recently hatched, live downy. Two other pairs, seen on large lakes, behaved as though they had young, possibly at small lakes nearby. Few places on the larger lakes were suitable for loons to nest as their banks were exposed to waves, and often raised and willow covered. Between 17 September and 2 October 1972, we often saw or heard a Common Loon, flying to or from the sea. Recorded (Todd 1963). Occasional (Jonkel and Knudsen MS). Six adults and 1 downy seen, 21-28 July (Knudsen MS). Seven seen, 13-21 July (Baldwin MS).

South Twin Island. Recorded (Todd 1963).

Arctic Loon, Gavia arctica

North Twin Island. Probably breeds. Scarcest of the loons in 1973. On 12 June, a pair,

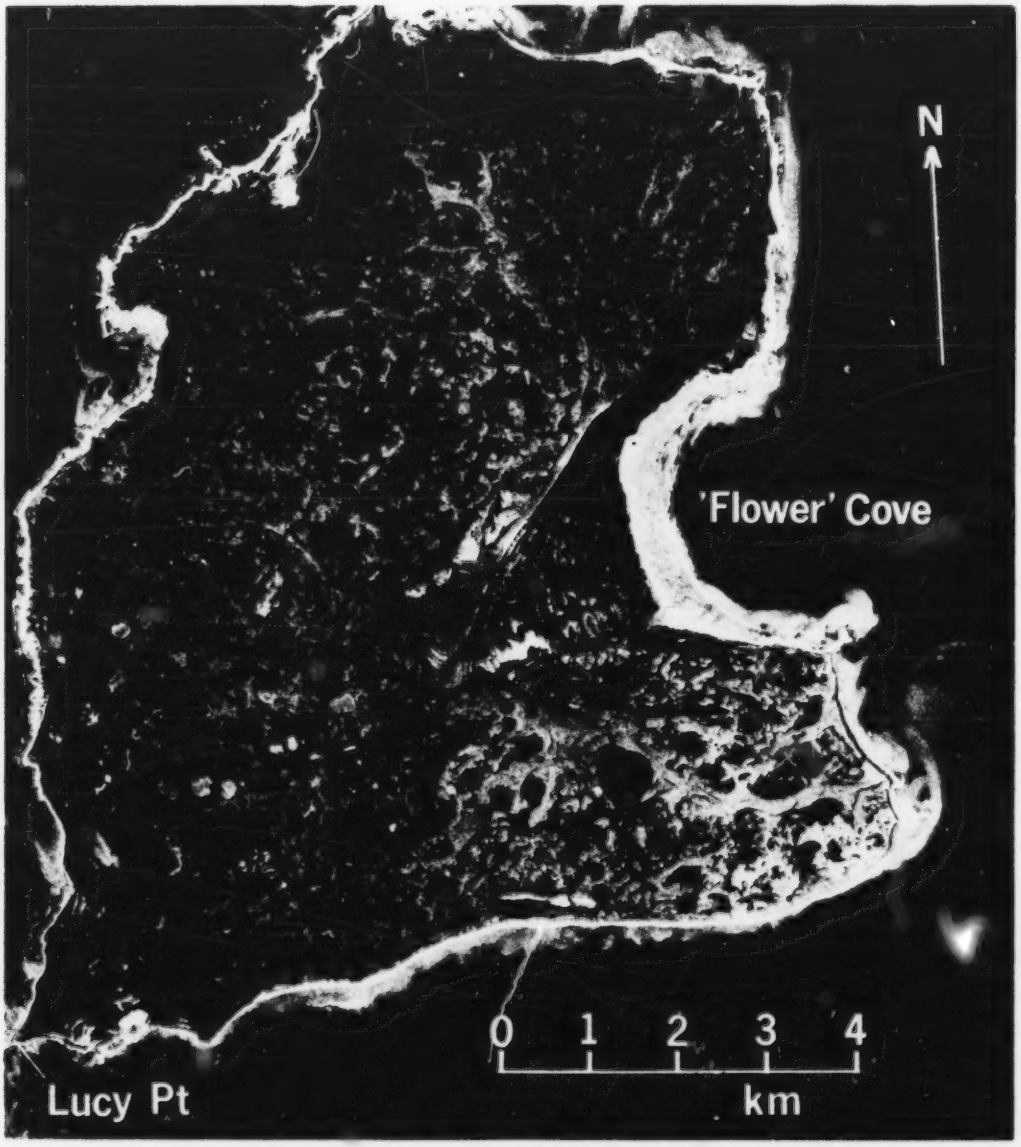

Figure 7. South Twin Island from the air. Original photo (A16340-44) supplied by Surveys and Mapping Branch of Department of Energy, Mines and Resources.

on a large lake, behaved as though going to nest, but they were not seen on subsequent visits. On 23 June, a pair was seen at sea and, on 5 July, a pair on a lake. Common (Jonkel and Knudsen MS). One seen 1 July (Knudsen MS). Eight seen, 14-21 July, (Baldwin MS).

South Twin Island. Seen occasionally in 1970. An adult female in NMNS was collected by Johansen on 27 July 1920. One seen on 27 July and 4 on 4 August (Todd 1963). Pair with half-grown young seen on 25 July (Baldwin MS).

Red-throated Loon, Gavia stellata

North Twin Island. Estimated population 8. Breeds. Twelve observations in 1973. The first loon, thought to be a Red-throated loon, was seen on 24 May; the first definitely identified on 31 May. On 22 June, I found a nest containing 2 eggs. On 27 June, this nest appeared deserted and contained only 1 egg, which disappeared next day. Common (Jonkel and Knudsen MS). One seen on 22 July (Knudsen MS).

South Twin Island. Occasionally seen in 1970. A partly feathered downy in NMNS was collected by Johansen on 27 July 1920.

Great Blue Heron, Ardea herodias

North Twin Island. One landed NW of the cabins on 23 August (Knudsen MS). There are several records for southern James Bay (Manning 1952, Todd 1963), and it has been recorded at Cape Henrietta Maria (Fig. 1) (Peck 1972).

American Bittern, Botaurus lentiginosus

North Twin Island. One heard by Carter on 4 and 5 July 1973, and by both of us on 6 July. They breed on both coasts of James Bay (Manning 1952; Todd 1963).

Canada Goose, Branta canadensis

North Twin Island. Estimated population 1,500. Breeds. Twenty-five hundred observations in 1973. For this species, the population estimate is based on the number of nests found in different parts of the island rather than on the number of geese seen. It therefore excludes birds that did not attempt to nest. The most densely populated area was in the vicinity of the cabins and southward to the head of 'Fish' Brook (Fig. 2).

When we arrived on 7 May, most Canada Geese were already in pairs and apparently occupying nesting territories, although the noise and quarrelling indicated that they had not yet settled down. Between 12 and 15 May, it was stormy with strong winds, snow and rain. During that period the number of geese in the vicinity of the cabins decreased, probably because they had spread out over the island, though some may have continued to the mainland.

Two nests were found on 16 May, 8 on 17 May, 4 on 18 May and 3 on 19 May. All contained full clutches except that 1 nest found on 16 May, 2 on 17 May and 1 on 18 May lacked 1 egg each, and 1 found on 17 May lacked 2 eggs. Between 20 and 21 May I found 15 nests. All these had full clutches as indicated by checks at least 48 hours later. The first young were seen on 15 June. Next day, 4 broods of young, 3 empty nests and 2 nests with hatching eggs were seen. After 17 June, only an occasional nest with eggs was found; the last on 24 June.

Twenty-eight nests found in May were assumed to contain complete clutches if a check 48 or more hours later showed no additional eggs. Eighty-seven nests found in June were assumed to have complete clutches, though these nests were not rechecked. The mean number of eggs in the May nests was 4.11 and in the June nests 4.13. The difference is clearly not significant and the mean for the combined 115 nests is 4.12 $\pm$ 0.110. The measurements of 276 eggs and weights of 125 eggs have been analysed in a previous paper (Manning 1978). Two nests not included in any of the above figures contained dwarf eggs (Manning and Carter 1977).

Eight out of 72 nests in a densely populated area on the east side of the island, first visited between 2 and 8 June, had been destroyed by predators. Since it was usually easier to see a sitting goose than a destroyed nest, the proportion actually destroyed was probably higher and perhaps amounted to 20 per cent by the end of the incubating period. Where the nests were more scattered, predation seemed to be less severe. As gulls were scarce on the east side of the island after 25 May, the predators were probably foxes, though none were seen in the area and, indeed, only one fox, a Red Fox (Vulpes fulva), was seen during the summer. At least 2 Polar Bears (Ursus maritimus) walked through the area and may have destroyed some nests.

At the beginning of the nesting season almost all the geese appeared to be paired. Later we saw small flocks of up to 12 geese which tended to split into pairs when they landed and were probably birds that had lost their nests. Soon after the young were hatched, most of the geese moved away from the main nesting area and presumably spread out over the island. By the beginning of July their numbers appeared to have decreased quite drastically, either because they were hidden in the dwarf birch and willow, as some certainly were, or because they had taken to the sea, as some were seen to do when disturbed. Baldwin (MS), whose party banded 523 geese on North Twin Island between 15 and 29 July 1972, estimated that the total population of North and South Twin Islands together, including young of the year, was over 5,000. During an air survey on 13 July they counted 847 adults on North Twin Island.

In 1972 the largest movement of Canada Geese occurred on 17 September, when, in 5 h, 300 were seen in small flocks flying south-southwest. Another 80 were seen flying in that direction in 6 h on 24 and 25 September. On 18 September, I counted 180 during a traverse of the north shore. Some were on the sea and some on the beach. In 5½ h on 19 and 20

September, I saw 150. Most of these were feeding on the inland tundra. After 20 September they became scarcer and most had left by 27 September. An occasional small (2-6) flock continued to be seen on the tundra until 8 October. The geese seen flying to the south-southwest appeared to have come from the mainland or other islands. Common; adults and young recorded on 31 July (Todd 1963). Common (Jonkel and Knudsen MS). About 1,000 adults and young seen between 21 July and 3 August (Knudsen MS). Four of the 10 adult geese collected by us had been banded by Baldwin's party.

South Twin Island. In 1970 the breeding population appeared at least as dense as that on North Twin Island in 1973. One of the commonest birds; adults and young collected; hundreds seen on 11 August (Todd 1963). During an air survey on 13 July, 424 adults were counted by Baldwin's party and between 24 and 26 July they banded 68 adults and young (Baldwin MS).

Subspecies. The 10 specimens collected by us are, as expected, typical B. c. interior. Baldwin (MS) noted that of the 355 geese over a year old that were caught, only 1 had previously been banded. This goose was paler below and larger than the typical Twin Islands goose. The mean weights of the 10 adults collected by Baldwin's party were: 5 ♂♂, 3.86 kg; 5 ♀♀, 2.88 kg. The mean culmen and tarsus measurements of these and of 56 of the adults banded were: 32 ♂♂, 52.4 ± 0.53 mm, 102 ± 0.82 mm; 34 ♀♀, 47.3 ± 0.48 mm, 95.3 ± 0.62 mm.

Brant, Branta bernicla

North Twin Island. Three flocks, totalling 38 birds, were seen by me and 1 flock of 11 by Carter between 10 and 19 June. One flock landed.

Snow Goose, Chen caerulescens

North Twin Island. Common spring and fall migrant. The first Snow Goose seen in 1973 was a single bird standing and later flying with 6 Canada Geese on 10 May. On 20 May, 2 flew over towards the southeast. The main migration started next day and continued until 2 June, during which time 320 (92 per cent blue phased) were counted, heading between north and west. Two of the largest flocks, 61 and 25, were flying north-northwest over the sea about 1 km north of the northern tip of the island. Evidently, at least in favourable weather, they may ignore the Twin Islands when crossing James Bay. On 25 May, I saw 1 flock of 5 and 1 of 17 feeding with a group of Canada Geese, and on 15 and 16 June, 13 days after any other Snow Geese had been seen, a flock of 6 blue and 2 white phased geese were observed near the south-west point. A clutch of eggs in NMNS, supposedly obtained from the Twin Islands in 1898 by an Eskimo, are indistinguishable from those of the Canada Goose (Manning and Coates 1952) and cannot be considered reliable evidence of nesting. Between 17 and 27 September 1972, I saw 350 Snow Geese flying towards the south-southwest and south-west. The largest number, 300, passed on 25 September. All appeared to have come

from the eastern mainland and were flying high and straight. On 2 October, Carter saw 42 flying in the same direction. These were the last seen on the east side of the island, but, on 6 October, I disturbed a flock of 60, 2 or 3 km inland from the south-west point. They flew out to sea in a south-west direction. About half the Snow Geese seen were blue phased and most, perhaps all, were adults.

Mallard, Anas platyrhynchos

North Twin Island. On 7 June 1973, Carter had a good view of a Mallard flying with 5 Black Ducks. I identified 1 with less certainty on 3 and 22 June.

South Twin Island. One seen in 1970.

American Black Duck, Anas rubripes

North Twin Island. Probably breeds occasionally. In 1973, 290 Black Ducks were recorded on or near the coast, mostly near the west coast, between 10 May and 5 July. Two moulting individuals were seen inland on 22 June. No evidence of breeding was obtained by us, but, on 3 August, Knudsen (MS) saw a female with 4 young, which had presumably been hatched on the island. In 1972, 250 Black Ducks were seen in 40 hours on or near the shore between 17 September and 10 October. About 70 of these were near the mouth of 'Fish' Brook (Fig. 2) on 22 September, 70 near the eastern end of the north-east coast next day, and 70 near the south-east point on 26 September. Although these 3 groups were made up of several small flocks, it seems quite likely that the same individuals were involved on each occasion. The last 3 Black Ducks were seen by Carter on 15 October. Common (Jonkel and Knudsen MS). Eighty seen between 22 July and 3 August (Knudsen MS). Small numbers seen regularly (Baldwin MS).

South Twin Island. Seen frequently around the coast in 1970, also a family of flightless young seen inland. Seen flying over camp on 22 July (Todd 1963). About 90 seen while circling the island by canoe (Baldwin MS).

Gadwall, Anas strepera

North Twin Island. One seen on 16 July (Baldwin MS). This seems to be the first record of this western duck in the James Bay region, though it has since been recorded at North Point (Fig. 1) (R.I.G. Morrison pers. comm.).

Common Pintail, Anas acuta

North Twin Island. Estimated population 200. Breeds. Two hundred and forty observations in 1973. First seen on 10 May. Regularly, mostly in pairs, from 19 to 31 May. Males predominated in June, but became scarce in July, perhaps because of moulting. Ten broods of young seen; the first, recently hatched, on 22 June. A male downy with no yolk left collected on 27 June. Baldwin (MS) saw a female with very small young on 21 July and

Jonkel and Knudsen (MS) found a clutch of 3 eggs still being incubated on 20 July. There is therefore a wide variation in hatching dates. In 1972, I saw 17 Pintails between 17 and 20 September. The last was seen by Carter on 12 October. Common (Jonkel and Knudsen MS). A hundred and twenty, including a group of 110 on a small lake near the west coast, seen between 22 and 31 July (Knudsen MS). Seen occasionally (Baldwin MS).

South Twin Island. Fairly common in 1970. Five seen flying (Todd 1963). On 24 July, Baldwin (MS) saw over 100 moulting Pintails on the sea near Lucy Point. Next day he saw a female with a brood.

Green-winged Teal, Anas crecca

North Twin Island. Estimated population 200. Breeds. Two hundred observations in 1973. First seen on 21 May. All 20 individuals seen in May were paired. Males predominated in June and to a lesser extent in July. First young, about a week old, seen on 5 July. Two other broods recorded. In 1972, 13 Green-winged Teal mostly singles and pairs, seen on small lakes or near the mouth of 'Fish' Brook (Fig. 2) between 17 and 29 September. Last seen on 11 October. Occasional (Jonkel and Knudsen MS). One seen on 29 August (Knudsen MS). A few seen (Baldwin MS).

South Twin Island. Several adults and young seen in 1970. A female and brood of six collected on 23 July (Todd 1963). Two females with a group of 15 young seen on 26 July (Baldwin MS).

Blue-winged Teal, Anas discors

North Twin Island. On 15 June 1973, Carter obtained a good view of a male on the west side of the island. This appears to be a northern record for James Bay, though they have frequently been reported at the southern end (Manning 1952, Todd 1963) and on the west coast as far north as Attawapiskat (Fig. 1) (Schueler, et al., 1974).

American Wigeon, Anas americana

North Twin Island. On 2 June 1973, I had an excellent view of a male near the cabins. On 15 June, I had another good view of a male with two Black Ducks on the west side of the Island. On the same day Carter saw a flock of six. Breeds on both coasts of James Bay (Manning 1952, Todd 1963).

Northern Shoveler, Anas clypeata

North Twin Island. On 15 June 1973 I had a good view of two males by a shallow lake near the west coast. The species has occasionally been recorded from the southern end of James Bay (Manning 1952, Todd 1963). There is also a single sight record for Cape Henrietta Maria (Fig. 1) (Peck 1972).

Greater Scaup, Aythya marila

North Twin Island. Fricke recorded Greater Scaups along the shore on 31 July (Todd 1963), but as no specimens have been collected the record must be considered doubtful. Nonetheless, it is likely that this species occurs and perhaps nests on the island. Todd (1963) considered the Greater Scaup to be more common than the Lesser Scaup in James Bay, but this has not been my experience (Manning 1952).

Lesser Scaup, Aythya affinis

North Twin Island. Estimated population 250. Breeds. Three hundred observations in 1973. As we identified no Greater Scaups, all sight records have been refered to this species. First seen (6 pairs) on 22 May, regularly thereafter. A nest with 8 eggs found on 15 June, had been destroyed when revisited on 30 June. One found on 22 June had 11 eggs (mean length 58.5 mm, breadth 41.0 mm) and 1 found on 7 July, 9 eggs, which were within about 5 days of hatching (mean length 57.9 mm, breath 41.1 mm). The volume index (mean length X mean breadth^2) of the first clutch was 98.3 cm^3 and of the second 97.8 cm^3. The volume index derived from the figures given by Bent (1951) for the Lesser Scaup is 90.0 cm^3 and for the Greater Scaup 119.2 cm^3. There can be little doubt, therefore, that both clutches were those of the smaller species. Females in obvious breeding condition have been taken on the east coast of James Bay (Manning and Macpherson 1952) but the above nests seem to be the first actually found in the James Bay area. As we recorded no scaups in 1972, it seems likely that they had left the area before 16 September. Scaup (sp.) common (Jonkel and Knudsen MS). Forty seen at sea on 22 July and 3 females with young on lakes between 28 and 31 July (Knudsen MS). Three seen on 21 July and larger numbers next day (Baldwin MS).

Common Goldeneye, Bucephala clangula

North Twin Island. Five hundred observations in 1973, excluding a flock of 700 ducks, thought to be this species, seen off the south-west point on 25 July. First seen on a small lake near the south-west point on 10 June. Commonest on or near the west coast. Occasionally seen along the south and north coasts and on a lake under 'Mordor' Escarpment. None seen more than 1 km inland and no evidence of breeding obtained. In 1972, 90 Common Goldeneye were seen in 31½ h travel along the coast between 27 September and 14 October; most were on the north and south-east coasts. Rare (Jonkel and Knudsen MS). Numerous in flocks at sea (Baldwin MS).

South Twin Island. A few seen along the coast in 1970. Fifty seen by A.C. Twomey between 8 and 9 September 1938 (Todd 1963). Hundreds seen on 24 July off the south coast (Baldwin MS).

Oldsquaw, Clangula hyemalis

North Twin Island. Estimated population 600. Eight hundred observations in 1973, including 400 along the coast in July. First seen (2 pairs) on 24 May; regularly thereafter. All were in pairs until 4 June. A nest with down and 6 eggs found on 5 June and another with 6 slightly incubated eggs on 7 June. Four other nests, found between 10 and 30 June, contained full clutches of 7,8,8 and 7 eggs. All nests, except one on an island in a lake, were concealed in dense dwarf birch and often well away from water. The first young, 1 or 2 days old, seen on 7 July and another 15 broods noted between that date and 25 July. Knudsen (MS) saw a brood on 17 and 23 July, and Baldwin (MS) recorded newly hatched young on 22 July. In 1972, I saw 750 Oldsquaws between 17 September and 10 October. All were on the sea close to shore. A favourite place was 'Only' Bay, where 500 were seen on 19 September and 200 on 23 September. Seen mixed with flocks of eiders (Todd 1963). Occasional (Jonkel and Knudsen MS). One hundred and twenty-five, including 110 off the north shore on 22 July, seen between 17 and 31 July (Knudsen MS). Seen regularly but not in large numbers (Baldwin MS).

South Twin Island. Fairly common in 1970. A set of infertile eggs collected on 23 July and a brood of 8 ducklings on 25 July (Todd 1963). Seen with young on 25 July (Baldwin MS). Oldsquaws are not known to nest south of South Twin Island in the James Bay region.

Common Eider, Somateria mollissima

North Twin Island. Breeds. In 1973, the first eiders were heard on the ice off the north point of 'Only' Bay on 4 June. On 7 June 15, Common Eiders were seen near there flying over the shore lead. Five hundred and fifty adults were recorded between 7 June and 25 July. Three hundred and ninety of these were males, seen between 20 and 25 July; nearly all were along the west coast. Fifty were females seen between the same dates, but mostly on the south coast. The remaining 110 were mostly males seen prior to 20 July, flying along the west coast. Only 2 pairs, 1 on 15 June and 1 on 24 June, were seen on inland lakes. Between 17 and 25 July, I saw 7 families either on the sea or the shore. Presumably some of these had been hatched on North Twin Island. Some might also have come from Walter Island (Fig. 1), where on 22 July we found 3 nests, 1 with eggs near hatching and 2 with eggs abandoned. Jonkel and Knudsen (MS) found nests of Common Eiders on North Twin Island with 6, 6, and 4 eggs. The 4 egg set was still fresh on 17 July. Knudsen (MS) saw 11 families on the sea between 22 and 28 July and Baldwin (MS) noted broods at sea on 19 July. In 1972, I saw ten Common Eiders on the north east coast on 27 September and 15 on 15 October. Large flocks of eiders mixed with Oldsquaws (Todd 1963). Occasional (Jonkel and Knudsen MS). About 240 adults seen between 22 and 28 July (Knudsen MS). Plentiful at sea (Baldwin MS).

South Twin Island. Females accompanied by young frequently seen near the shore in 1970. Seen at 'Flower' Cove (Fig. 7) on 22 July; common on 11 August (Todd 1963). Large numbers

off the south coast on 24 July (Baldwin MS).

King Eider, Somateria spectabilis

North Twin Island. Two males and a female seen amongst the ice near the west coast on 14 June 1973. Young male collected on 31 July (Todd 1963).

South Twin Island. An adult female and a partly feathered downy in NMNS were collected by Johansen on 18 July 1920. This seems to be a southern breeding record for the species.

White-winged Scoter, Melanitta deglandi

North Twin Island. Estimated inland population 200. Breeds. In 1973, 230 inland observations, 650 coastal and, on 23 June, 300 farther seaward on 'Only' Bay. First seen on 20 May. A female shot at sea on 23 June had a complete egg in its oviduct and 3 empty follicles. A nest with 8 eggs was found on 11 July in a 1 m^2 patch of low willow, surrounded by marshland, about 1 km from the nearest lake. The mean length and breadth of the eggs were 70.1 and 47.0 mm. On 17 July, 2 females with broods of young were seen on lakes. Occasional (Jonkel and Knudsen MS). About 50 recorded, mostly at sea, between 22 and 31 July (Knudsen MS). Very numerous, hundred seen at sea (Baldwin MS).

South Twin Island. In 1970, I frequently saw a female with young on a lake near the north end of the island. This and the above observations on North Twin Island appear to constitute the only breeding records for the James Bay region and, indeed, for eastern Canada (Godfrey 1966). Hundreds seen off the south coast on 24 July (Baldwin MS).

Surf Scoter, Melanitta perspicillata

North Twin Island. Most of about 30 scoters seen on 31 May 1973 amongst the ice off the north point of 'Only' Bay were thought to be this species. Carter saw 2 on 1 June and Baldwin (MS) 5 on 27 July.

South Twin Island. In 1970, a female with young was frequently seen on a lake near the north end of the island. There are also breeding records (Todd 1963) for Charlton and Sheppard Island (Fig. 1).

Black Scoter, Melanitta nigra

North Twin Island. On 19 May 1973, 3 males and 3 females were displaying on a small lake which they refused to leave even when a male was collected. Two males and 2 females were seen in a different area on 29 May but none was identified after that date. The species is not known to breed in the James Bay region. On 19 September, during our only canoe trip in 1972, about 1,500 dark winged scoters were seen. Those close enough for specific identification were Black Scoters. A raft of 150 seen off the north coast on 2 September (Knudsen MS). Recorded on 15 July (Baldwin MS).

South Twin Island. A few seen along the beach (Todd 1963). Large numbers off the south

coast on 24 July (Baldwin MS).

Common Merganser, Mergus merganser
Red-breasted Merganser, Mergus serrator
North Twin Island. Seventy mergansers were recorded between 24 May and 25 July. Of these 20 were definitely Common Mergansers and 10, all apparently paired, Red-breasted Mergansers. No paired Common Mergansers were identified, but both species were seen on lakes up to 1 km inland. Thirty-five of the 70 mergansers recorded were along the shore. The first merganser was seen on 24 May; the first Red-breasted Merganser identified on 2 June and the first Common Merganser on 10 June. In 1972, I saw 13 mergansers not specifically identified between 19 and 20 September and on 30 September found a Red-breasted Merganser that had evidently died when a trout or small char lodged in its gullet. Common Merganser, rare (Jonkel and Knudsen MS). Four Red-breasted Mergansers seen on lakes and one found dead on the shore between 26 and 30 July (Knudsen MS). Fifteen Red-breasted and one Common Merganser recorded (Baldwin MS).
South Twin Island. In 1970, several unidentified mergansers were seen and a skeleton found. A flock of Red-breasted Mergansers seen on 24 July (Todd 1963). Seven Red-breasted Mergansers seen on 24 July (Baldwin MS).

Rough-legged Hawk, Buteo lagopus
North Twin Island. I saw 5 single Rough-legged Hawks between 11 and 25 May 1973. Baldwin (MS) saw 3 between 14 and 19 July. The absence of mice and cliffs makes it unlikely that this or other raptors nest or remain long on either Twin Island.
South Twin Island. One seen on 24 July (Baldwin MS).

Marsh Hawk, Circus cyaneus
North Twin Island. Carter and I saw a female Marsh Hawk 6 times between 24 May and 16 July 1973. Fricke saw 1 on 1 August (Todd 1963) and Knudsen (MS) 1 on 28 and 31 July and on 4 September.
South Twin Island. One seen by me on 2 August 1970 and 1 by Baldwin (MS) on 24 July.

Gyrfalcon, Falco rusticolus
North Twin Island. One or more regularly seen hunting ptarmigan in 1971 from 23 November to mid-December (R.H. Russell, pers. comm.). A female from Moose Factory was described by Ridgway (Baird, Brewer, and Ridgway, 1905) and the National Museum of Natural Sciences has two specimens taken at Fort George (Fig. 1) in late November 1974.

Peregrine Falcon, Falco peregrinus

North Twin Island. On 6 October 1972, I had a good view of a Peregrine Falcon, which was flying west over the west coast. One or more regularly seen hunting ptarmigan in 1971 from mid-November to mid-December (R.H. Russell, pers. comm.).

Merlin, Falco columbarius

North Twin Island. One seen on 2 September (Knudsen MS).

Willow Ptarmigan, Lagopus lagopus

North Twin Island. Estimated population 800. Breeds. Two hundred and forty observations of males and 40 of females. Females collected in 1973 on 25 and 31 May, and on 6 June had 2, 4 and 3 empty follicles respectively. On 14 June, Carter found a nest with 4 eggs. Recently hatched young were seen on 26 June and 20 other broods between that date and 20 July. During the same period only 1 pair was seen, which appeared not to have young. Five single males were also seen, but these may have only temporarily left their families. Young seen on 11 July could fly 200 or 300 m and, on 16 July, 0.5 km. A brood seen on 19 July seemed quite independent of its parents, which tried to creep away unobserved instead of flying excitedly towards me and displaying as parents had done previously. Knudsen (MS) recorded 18 families between 21 and 31 July and noted that some young were still unable to fly on 21 July. Baldwin (MS) saw unhatched eggs on 15 July. Between 17 September and 15 October, I saw 300 Willow Ptarmigan either singly, or in flocks that occasionally contained up to about 20 birds. There were usually one or two flocks with a good number of young birds in them near the north point but the flocks seen inland from the cabins were mostly adults, and I suspect that it may have been a poor breeding season. The total population of the island, including young, was estimated to be 1,500. Knudsen reported that ptarmigan were scarce on North Twin Island in the summer of 1971, perhaps because of the large fox population. Ptarmigan were still scarce when he and Russell returned to the island on 12 November. Between 23 and 27 November, however, hundreds, perhaps thousands, suddenly appeared accompanied by Peregrine Falcons, Gyrfalcons and Snowy Owls. The ptarmigan and raptors remained numerous until about mid-December, when the former again became scarce and the latter disappeared (R.H. Russell pers. comm.). If as Russell believes the ptarmigan were migrants, it would be interesting to know whether they came from the east or west coast of James Bay and whether the movement occurs annually. The fact that our Twin Islands specimens (Table 1) show a tendency towards L. l. albus may be an indication of a migration from the west coast. Male collected (Todd 1963). Common (Jonkel and Knudsen MS). Fourteen adults and two broods recorded (Baldwin MS).

South Twin Island. In 1970, at least as numerous as on North Twin Island in 1973. One or more collected (Todd 1963) Two seen on 25 July (Baldwin MS).

Subspecies. The main difference between L. l. albus to the west of Hudson Bay and L. l.

Table 1. Bill measurements of Willow Ptarmigan, Lagopus lagopus, in the National Museum of Natural Sciences.

Population	Bill length	Bill height	Bill width
		Male means	
Quebec (L. l. ungavus)	(39) 11.78	(21) 10.67	(40) 9.87***
Twin Islands (L. l. ungavus)	(14) 11.51	(12) 10.50	(14) 9.24
West of Hudson Bay (L. l. albus)	(48) 10.80**	(42) 9.86***	(50) 9.28
	Within population (error) variances (s^2)		
	0.467	0.201	0.191
	Within population coefficients of variation		
	6.0	4.3	4.7
		Female means	
Quebec (L. l. ungavus)	(22) 10.95	(14) 10.18	(22) 9.36***
Twin Islands (L. l. ungavus)	(8) 10.49	(6) 9.87	(9) 8.87
West of Hudson Bay (L. l. albus)	(42) 9.93*	(33) 9.19***	(40) 8.88
	Within population (error) variance (s^2)		
	0.372	0.194	0.106
	Within population coefficient of variation		
	5.8	4.5	3.6

Differences between the means of the Quebec and the west of Hudson Bay series are highly significant ($P<0.001$) for all 3 measurements. One, 2 and 3 asterisks against the Quebec and the West of Hudson Bay means denote significant differences between these means and those of the Twin Island series at the 5, 0.5 and 0.1 per cent levels respectively. The numbers of specimens are in parentheses. Standard errors for the means may be obtained as $(S^2/N)^{\frac{1}{2}}$.

ungavus from Quebec and Labrador is the greater bill size in the latter (Ridgway and Friedman 1946). Todd (1963), however, found no appreciable difference between Quebec and Churchill specimens. I have used 3 measurements: bill length from the anterior edge of nostril; bill height at angle of gonys; and bill width at anterior end of nostril. The last was substituted for width at gape (Ridgway and Friedman 1946, Todd 1963), which I found difficult to measure consistently. Actually, there is likely to be a considerable personal bias in taking any of these measurements, even bill length which may also be affected by seasonal or other unusual wear. Only adults (over 9 months) taken between 7 May and 10 September were used.

The 3 bill measurements of the Québec specimens (including some from islands in the Northwest Territories situated along the east coast of James Bay) averaged larger ($P<0.001$) in both sexes than those from the west of Hudson Bay (Manitoba, 15 males, 8 females; Northwest Territories, 18 males, 8 females; Yukon, mainly Dempster Highway, 18 males, 25 females). The joint non-overlaps for length (x_1), height (x_2) and width (x_3) were 76, 81, and 75 per cent in males and 80, 87 and 77 per cent in females. The discriminant function for separating males of the two series was $100\ X = 2.06x_1 + 4.26x_2 + 3.14x_3$ with a mid-point of 96.9. For females it was $100\ X = 4.59x_1 + 12.40x_2 + 1.75x_3$ with a mid-point of 184.1. The joint non-overlaps given by these functions were 84 per cent for males and 91 per cent for females. These figures and those in Table 1 justify the continued recognition of the Québec population as a distinct race, particularly as there is no evidence in the material available of an east-west cline in decreasing bill size within the population, west of Hudson Bay; in fact, bill width increases in both sexes from Manitoba through the Northwest Territories to the Yukon. The differences were highly significant in males ($P<0.005$), though not significant in the females.

In view of the geographical position of the Twin Islands, it is not surprising that there were no significant differences (Table 1) in bill length and height between specimens from these islands and those from Québec, especially as nearly half the latter came from the James Bay coast. What is surprising is that there was a significant difference ($P<0.001$) in bill width of both sexes between the Twin Islands and the Québec series, whereas the differences between the Twin Islands series and that from west of Hudson Bay were negligible. Twin Island specimens, therefore, resemble L. l. ungavus in two of the characters measured and L. l. albus in one. Using the above discriminants X averages 97.4 for Twin Islands males and 186.1 for females. These means are 0.5 and 2.0 above the midpoints between the Québec and west of Hudson Bay series. The Twin Island population may therefore be referred to L. l. ungavus.

Sandhill Crane, Grus canadensis

South Twin Island. One seen on the south shore from a distance of 50 m on 25 July (Baldwin MS).

Semipalmated Plover, Charadrius semipalmatus

North Twin Island. Estimated Population 1,200. Breeds. Thirteen hundred observations in 1973. First seen on 20 May. Became numerous next day. First nest, with 4 eggs, found on 14 June. Later I found 4 other nests with 4 eggs each and 1 with 2 eggs - all complete clutches. The first young, just hatched, were seen on 9 July. A male downy (6.9 g) with a little yolk left was collected on 15 July. Knudsen (MS) saw 1 clutch hatching on 26 and one on 27 July. Baldwin (MS) recorded that a clutch of 3 eggs hatched between 13 and 14 July. Jonkel and Knudsen (MS) found eggs still being incubated between 13 and 16 July. On 24 and 25 July 1973, I estimated that there were 420 adults on the beaches and mud flats, probably most of these were local residents as a large number of flightless young were also present. In 1972, Semipalmated Plovers were seen only near the shore, where 39 were recorded in 20 h of observation between 17 and 29 September. The last 2 were seen by Carter on 4 October. Common (Jonkel and Knudsen MS). Ninety adults recorded between 21 July and 2 August (Knudsen MS). Sand and pebble ridges well populated (Baldwin MS). The mean length, breadth and volume index (Length X breadth^2) for 14 eggs from four nests were: 3.31 $\pm$ 0.025 mm, 2.41 $\pm$ 0.016 mm and 19.24 $\pm$ 0.347 cm^3.

South Twin Island. Common in 1970. Common, downy collected (Todd 1963). Common (Baldwin MS).

Killdeer, Charadrius vociferus

North Twin Island. Estimated population 25. Twenty-eight observations in 1973. First seen on 7 May. Appeared to be more numerous in May than in June or July. The only evidence of breeding was a copulating pair seen by Carter on 3 June.

American Golden Plover, Pluvialis dominica

North Twin Island. A fairly common fall migrant. Four seen on the west coast on 25 July 1973. In 1972, 159 were recorded in 72 h between 17 September and 15 October. Thirty-four seen between 17 and 20 September were mostly adults. Young appeared to arrive suddenly on 21 September and within a few days all, or nearly all, adults had left. At first, Golden Plovers were frequently seen inland as well as along the shore; later they were mostly along the shore. Their numbers decreased after the end of September, but a few were seen until observations ceased on 15 October. Two seen by Knudsen (MS) on 8 August.

South Twin Island. Seen occasionally near the north-west point between 26 July and 14 August. More numerous after 3 August.

Black-bellied Plover, Pluvialis squatarola

North Twin Island. One seen by Carter on 9 June 1973 and 1 by me on 6, 11 and 12 June. In 1972, 8 were seen in 69 h between 18 September and 14 October.

South Twin Island. One seen on 26 July (Baldwin MS).

Ruddy Turnstone, Arenaria interpres

North Twin Island. An abundant fall migrant. In 1973, rather scarce until mid-July when they quickly became numerous along the coast. None seen inland and no evidence of nesting obtained. Seventy recorded between 6 and 16 June, mostly on the north-west and west coasts, but only one between 17 June and 19 July. On 20 and 21 July, 250 were seen along the west and south coasts. On 24 and 25 July, they were the commonest birds on all coasts and I estimated that there were 1,000 on the beaches and tidal flats. In 1972, we recorded only 1, a female, collected on 27 September. Presumably the main migration was over before we arrived on 16 September. One collected on 1 August (Todd 1963). Rare (Jonkel and Knudsen MS). One seen on 31 July and 9 August, 18 on 25 August (Knudsen MS). Eleven seen on 23 July (Baldwin MS).

South Twin Island. Common along the shore in 1970. First seen along the beach on 23 July; several small flocks seen on 28 July (Todd 1963). A number seen by Twomey on 8 September 1938 (Todd 1963).

Common Snipe, Capella gallinago

North Twin Island. Estimated population 30. Breeds. Thirty-two observations (heard or seen) in 1973. First recorded 21 May. Carter found a brood of downy young, about 5 days old, on 7 July. One of these downies taken to the cabin for sketching went into a trance-like state and stood motionless in any position in which it was placed. In 1972, 1 was seen on 24 September. Rare (Jonkel and Knudsen MS).

Whimbrel, Numenius phaeopus

North Twin Island. In 1973, 1 seen on 1, 12 and 14 June, and 8 on the west coast on both 20 and 21 July. Between 24 and 25 July, 27 seen a little inland from the north and west coasts, and 19 along the shores of those coasts. On 25 July, 1 was also seen on the east coast. Fricke (Todd 1963 p. 307) considered them common, but his report of "young curlews, about the size of lesser yellow-legs, flying" must surely be due to an error in identification. Whimbrels are, however, known to nest as far south as Lake River (Fig. 1) on the west James Bay coast (Manning 1952) and may nest occasionally on the Twin Islands. Rare (Jonkel and Knudsen MS). Knudsen saw 40, including a flock of 25 on 9 August, between 27 July and 9 August. Seventeen seen (Baldwin MS).

South Twin Island. Fairly common; 1 collected, 21 July (Todd 1963). Ten seen (Baldwin MS).

Greater Yellowlegs, Tringa melanoleuca

North Twin Island. In 1973, scarce until mid-July. One seen on 18 May and 3 on 20 May. Between 9 and 25 July, 26 seen. No evidence of nesting obtained. In 1972, I saw 10 in 15 h spent inland between 17 September and 2 October. They were in ones, twos and threes,

usually at the edge of lakes. None seen near the shore. Carter saw the last on 8 October. Rare (Jonkel and Knudsen MS). Two seen on 31 July (Knudsen MS). Six seen on 17 July (Baldwin MS).

South Twin Island. Fricke (Todd 1963) reported Greater Yellowlegs, were common along the beaches on 21 and 28 July 1935 and on 11 August 1936.

Lesser Yellowlegs, Tringa flavipes

South Twin Island. Fricke (Todd 1963) reported that Lesser Yellowlegs were common along the beaches on 21 and 28 July 1935 and on 11 August 1936. Baldwin (MS) recorded 3 on 25 July and a single flying young next day. They occur and probably nest on both sides of James Bay (Manning 1952, Manning and Macpherson 1952).

Red Knot, Calidris canutus

North Twin Island. On 20 July 1973, 4 seen with a flock of Ruddy Turnstones on west coast.

South Twin Island. One collected on 25 July (Todd 1963).

Purple Sandpiper, Calidris maritima

North Twin Island. Estimated population 100. Breeds. Fifty observations in 1973; all on the west side of the island. First seen on our first visit to the north-west coast on 4 June. Later, several appeared to have nests or young, and a flightless, part downy was collected on the south-west coast on 25 July. This appears to be the only breeding record for James Bay, or indeed for anywhere south of the Belcher Islands (Godfrey 1966).

Pectoral Sandpiper, Calidris melanotos

North Twin Island. Two sandpipers thought to be of this species were seen inland on 30 September 1972. One seen on 23 July (Baldwin MS).

South Twin Island. A few seen (1 collected) as early as 21 July, but no sign of nesting (Todd 1963).

White-rumped Sandpiper, Calidris fuscicollis

North Twin Island. Common fall migrant. Nine sandpipers, seen between 21 May and 3 June 1973, were thought to be White-rumped Sandpipers. On 17 July, 1 was definitely identified among a flock of Sanderlings and by 24 July they were numerous on all coasts. On 24 and 25 July, the beach and tidal flat population was estimated to be 500. In 1972, first recorded on 2 October, when 4 were seen. After 5 October they became comparatively common and, between 2 and 14 October, 68 were recorded in 20 h spent along the shore. They were commonest near the mouth of 'Fish' Brook (Fig. 2). Two seen on 25 August (Knudsen MS).

South Twin Island. Common along the shore in 1970. One collected on 28 July (Todd 1963).

Baird's Sandpiper, Calidris bairdii

South Twin Island. A few seen on the tidal flats in 1970.

Least Sandpiper, Calidris minutilla

North Twin Island. Estimated population 500. Breeds. Two hundred and fifty observations in 1973. First seen on 21 May. Became plentiful three days later. Rarely seen on the beaches and tidal flats. None identified there on 24 and 25 July, when we circled the island. Nests, each with 4 eggs found on 14 and 16 June and on 3 July. First newly-hatched young seen on 5 July. In 1972, I saw 2 Least Sandpipers on the tundra on 19 September. Common (Jonkel and Knudsen MS). Eight seen, all inland, between 24 and 31 July (Knudsen MS). Common (Baldwin MS). The mean length and breadth of a clutch of 4 eggs were 29.6 mm and 20.5 mm.

South Twin Island. Ten recorded during a 4 h walk on 18 July 1949, some apparently nesting (Manning and Coates 1952). A few seen in 1970 but not common. Mixed flocks of Least and White-rumped Sandpipers feeding in tidal pools on 28 July (Todd 1963). Common near the south coast on 25 July (Baldwin MS).

Dunlin, Calidris alpina

North Twin Island. Estimated population 150. Breeds. An abundant fall migrant. Sixty observations between 21 May and 21 July 1973. Newly-hatched young were found on 24 June. This extends the known breeding range about 250 km south-east from Cape Henrietta Maria. Fall migrants began to arrive on the west coast of the island about 25 July, when there were estimated to be 200 Dunlins on the beaches and tide flats. In the second half of September 1972, they were the second commonest shorebird and 250 were seen in 19 h spent along the shore (13 per h). They were particularly numerous for the first few days after our arrival on 17 September, then their numbers decreased. They increased again about 4 October and reached a peak about 5 days later. Between 28 September and 3 October only 60 were seen in 14 h (4.3 per h), whereas betwen 4 and 15 October 460 (26 per h) were seen in 17½ h. After 6 October they outnumbered Sanderlings and became the commonest shorebird. They were particularly numerous near the mouth of 'Fish' Brook, but were also common 2 or 3 km north of the cabins and near the north point of 'Only' Bay. They were less often seen along the north-east coast and never inland. Four seen on 22 July (Baldwin MS).

South Twin Island. One seen on 7 August 1970.

Subspecies. The means and standard deviations for culmen length given by Browning (1977) for his own measurements of Alaska and north Canada specimens indicate a joint-non overlap of 81%; a reduction from my previous estimate of 84% (Manning 1976). These figures are rather low for subspecific separation, but in view of the distance separating the populations, recognition of C. a. hudsonia as a distinct race breeding in central and eastern, northern Canada seems justified. The exposed culmen lengths of the 3 North Twin

Island males are, 35.5, 36.3 and 36.4 mm; and of the 5 females, 36.2, 36.7, 36.8, 40.8 and 41.1 mm. C. a. hudsonia and C. a. pacifica are readily separable on plumage characters quoted by Browning (1977).

Semipalmated Sandpiper, Calidris pusilla

North Twin Island. Estimated population 2,000. Breeds. One thousand observations in 1973. First seen on 30 May. On 24 and 25 July, there were estimated to be 800 on the beaches and tidal flats; some were probably fall migrants. The first nest, with 1 egg, found on 12 July; seven other nests, each with 4 eggs found between 14 June and 11 July. On 3 July, a 9th nest contained 1 egg, 1 dead and 1 live young. Two-day old young seen on 17 July (Baldwin MS). In 1972, I recorded 35 Semipalmated Sandpipers in 5½ h (6.3 per h) along the shore between 16 and 19 September. After that their numbers decreased and only eleven were seen in 14½ h (0.8 per h) between 20 and 28 September. Recorded (Todd 1963). Common (Jonkel and Knudsen MS). Seventy seen between 24 July and 2 August (Knudsen MS). Common (Baldwin MS). The mean length, breadth and volume index (length X breadth^2) of 15 eggs from 4 nests were 30.73 $\pm$ 0.196 mm, 21.13 $\pm$ 0.102 mm and 13.72 $\pm$ 0.114 cm^3.

South Twin Island. Common, particularly along the shore in 1970. Common, a brood of young collected on 28 July (Todd 1963). Common (Baldwin MS).

Subspecies. The exposed culmen/bill width ratio of the 4 specimens are: 11.2, 11.4, 11.5, and 10.9. All are, therefore, referable to the unnamed eastern population (Manning et al. 1956).

Sanderling, Calidris alba

North Twin Island. A rare spring and an abundant fall migrant. In 1973, a female was collected on 21 May and 11 seen between 9 and 18 June. Then none was seen until 9 July, after which they became plentiful on all coasts. On 15 July, there were 100 between the cabins and the north point of 'Only' Bay and on 17 July, 100 between the cabins and 'Fish' Brook. On 20 and 21 July, 300 were seen on the west coast and 200 on the south coast. On 24 and 25 July, the shore population was estimated to be 1,000. None was seen inland. In 1972, Sanderlings were by far the commonest shorebird during the first part of our stay and 2,200 were seen in 31 h (71 per h) along the shore between 17 September and 2 October. After that their numbers declined and in 7½ h between 3 and 6 October only 300 (40 per h) were seen; in 12 h between 7 and 15 October only 65 (5.4 per h). One collected on 1 August (Todd 1963). Occasional (Jonkel and Knudsen MS). One hundred seen between 23 and 25 July (Knudsen MS). Twelve seen on 22 July (Baldwin MS).

South Twin Island. Quite common along the shore in 1970.

Short-billed Dowitcher, Limnodromus griseus

North Twin Island. Estimated population 30. Breeds. Thirty-five observations in 1973.

First seen (6 together near a small lake about 1½ km south of the cabins on 20 May. They were very tame and one or more was usually to be seen on the border of that lake until 3 June. On 24 June, I found a brood of 4 young about 48 h old, in the centre of a large marsh about 3 km south-southwest of the cabins. While I was watching the parents three other dowitchers arrived, apparently attracted by the alarm calls. A few days later, 2 other pairs occupying similar habitats behaved as though they had young. This is the first breeding record for the James Bay region.

South Twin Island. In 1970, I saw several near the north-west point on 2 August and a few between that date and 14 August when we left.

Subspecies. The single male collected (wing chord 138.2 mm, culmen 50.3 mm, tarsus 36.3 mm) is clearly referable to the eastern race. The underparts are moderately spotted and very white, similar to the fifth specimen from the top on Plate 3 of Pitelka (1950). Pitelka also assigned a probable breeding male taken near Fort Albany (Fig. 1) on 16 July to L. g. griseus. On the other hand, 4 closely-matched, apparently non-breeding females (mean measurements 144.9, 61.1 and 37.2 mm) in NMNS taken at North Point (Fig. 1) between 4 and 13 July 1975 have moderate to light spotting and deeply coloured ventra, which closely resemble Manitoba specimens of L. g. hendersoni. Perhaps they were early south-bound migrants. Two NMNS specimens in juvenal plumage taken on Akimiski Island (Fig. 1) on 12 August 1947 by H.C. Hanson indicate that that may also be a breeding area.

Hudsonian Godwit, Limosa haemastica

North Twin Island. One seen by Carter on 15 June and 6 by me between 10 and 21 July. All were on the west side of the island. On 25 July, there were 30 on the west, and 5 on the SW coast. One seen on 23 July (Baldwin MS).

South Twin Island. Three seen on 1 August 1970 and a few others between that date and 14 August. Four seen on 26 July (Baldwin MS).

Northern Phalarope, Lobipes lobatus

North Twin Island. Estimated population 1,000. Breeds. Eight hundred and eighty observations in 1973. First seen on 2 May and regularly thereafter. A female collected on 19 June had an egg in the oviduct and two empty follicles. A nest with 4 eggs was found on 22 June and young very recently hatched on 9 July. On 24 and 25 July, I estimated that there was a total of 100 Northern Phalaropes on the shores and mud flats of all coasts. Most were at 'Only' Bay. Except for a stray, seen by Carter on 15 October 1972, all had apparently left before we arrived on 16 September. Common (Jonkel and Knudsen MS). Sixty seen between 21 July and 3 August (Knudsen MS). Common (Baldwin MS).

South Twin Island. Common in 1970 and flightless young seen. Common; a small series collected, including 3 young (21, 27 July and 4 August) completing post-natal moult (Todd 1963). Common (Baldwin MS).

Parasitic Jaeger, Stercorarius parasiticus

North Twin Island. One seen on 18 July 1973. One seen on 22 July (Baldwin MS).

Glaucous Gull, Larus hyperboreus

North Twin Island. An adult was seen by Carter on 19 May 1973 and 1 by me on 25 May. On 17 July I saw a subadult gull that was almost certainly of this species.

Herring Gull, Larus argentatus

North Twin Island. Estimated population 80. Breeds. Four hundred observations in 1973. Scarce on the east side of the island after 1 June. About 25 pairs had nests, mostly on rocks in lakes on the west side of the island. On 30 June, 12 nests were examined. Four contained 3 eggs each, with pipped eggs in 2 of them, 3 nests were empty, 1 contained 1 downy young and 4 had both eggs and young. In 1972, their numbers remained fairly constant throughout our stay. A total of 550 were seen during 51 h along the shore (11 per h) between 17 September and 15 October. They were seldom seen inland. During the first 10 days about half were immatures but, later, adults predominated. Occasional (Jonkel and Knudsen MS). Twenty-five seen between 21 July and 3 August (Knudsen MS). Seen occasionally (Baldwin MS). The length, breadth and volume index (length X breadth^2) of 12 eggs from 4 nests were 75.4 $\pm$ 0.77 mm, 51.2 $\pm$ 0.61 mm, 197 $\pm$ 5.0 cm^3.

South Twin Island. Fairly common in 1970. A few adults seen on 25 and 27 July 1935 (Todd 1963).

Common Tern, Sterna hirundo

North Twin Island. A single individual was identified in a flight of terns along the shore on 14 July (Baldwin MS). The species is common in southern James Bay and has been recorded north to 53°24' on the east coast (Todd 1963).

Arctic Tern, Sterna paradisaea

North Twin Island. Estimated population 500. Breeds. Fourteen hundred observations in 1973. First seen (4 near the SW point) on 10 June. Two seen inland 2 days later and 200 on the west coast on 16 June. Their arrival at North Twin Island was therefore 9 days ahead of that recorded in 1971 for the Belcher Islands (Manning 1976) some 300 km further north (Fig. 1). This tends to support the suggestion made by Godfrey (1973) that the James Bay population migrates overland from the St. Lawrence River. Four major nesting sites were visited: 1) grassy islands in two shallow lakes 5 km north of the south-west point (60 terns on 11 July); 2) 'Guillemot' Island (50 terns on 23 June and 200 terns on 18 July); 3) a gravel island in a lake 3 km north of the cabins (150 terns on 19 July); 4) a tidal pebble island near the centre of the west coast (70 terns on 20 July). Terns were also seen during the nesting season about an island in a lake 1 km north of the south point. No

downy young or pipped eggs were found on 'Guillemot' Island (Fig. 2) on 18 July but next day several nests at the lake 3 km north of the cabins contained pipped eggs and 8 downy young were seen. On 10 and 11 July, 4 nests on the grassy islands near the west coast contained 1 egg, 17 nests 2 eggs and 2 nests 3 eggs. On 18 July, 6 nests on 'Guillemot' Island contained 1 egg, 26 nests 2 eggs and 1 nest 3 eggs. All nests at both places were throught to contain complete clutches. The mean number of eggs in the 56 nests was 1.9. Eggs from 124 nests were measured and will be discussed elsewhere. We saw no terns in 1972 and presumably they had all left before we arrived on 16 September. One collected on 1 August (Todd 1963). Occasional (Jonkel and Kundsen MS). One hundred and ten, including 65 at 'Guillemot' Island on 29 July, seen between 21 July and 3 August (Knudsen MS). Small groups seen occasionally (Baldwin MS).

South Twin Island. Common in 1970. A few seen by Twomey on 8 September 1938 (Todd 1963).

Black Tern, Chlidonias niger

North Twin Island. Three seen on 19 July (Baldwin MS). This is a northern record for the James Bay region, though W. Spreadborough (Macoun and Macoun 1909) recorded it breeding near Albany (Fig. 1).

Black Guillemot, Cepphus grylle

North Twin Island. In 1973, about 50 were seen at 'Guillemot' Island on 23 June and on 18 and 22 July. On the last two dates, nests with eggs were found amongst the boulders and on 22 July a downy was collected from a hatching egg. The only other Black Guillemot seen was a male collected at the south-west point on 9 July. Rare (Jonkel and Knudsen MS). Knudsen estimated that there were 25 guillemots on 'Guillemot' Island and 15 to 20 on an unidentified point on 30 July. Two seen (Baldwin MS). The mean length, breadth and volume index (length X breadth^2) of 18 eggs from eleven nests were: 58.2 $\pm$ 0.66 mm, 38.9 $\pm$ 0.24 mm, and 88.2 $\pm$ 1.58 cm^3.

South Twin Island. A few seen (Baldwin MS).

Great Horned Owl, Bubo virginianus

North Twin Island. A grey individual seen on 27 July (Baldwin MS).

Snowy Owl, Nyctea scandiaca

North Twin Island. One seen on three occasions in 1972. Two seen by Knudsen (MS) on 29 August. Regularly seen hunting ptarmigan in 1971 from 23 November to mid-December (R.H. Russell pers. comm.).

Hawk Owl, Surnia ulula

North Twin Island. Carter had a good view of a Hawk Owl on 18 May 1973, and on 22 July we

picked up a still feathered skeleton on nearby Walter Island (Fig 1).

Common Flicker, Colaptes auratus

North Twin Island. Nineteen were seen between 10 and 28 May 1973, mostly in the vicinity of 'Mordor' Escarpment. Knudsen (MS) recorded 1 on 8 August and 3 on 11 September. I saw 1 on 22 September 1972.

Eastern Kingbird, Tyrannus tyrannus

North Twin Island. On 3 July 1973, I had a good view of an Eastern Kingbird perched on a small dead tree. This is a northern record for the species in the James Bay region. It breeds at Moose Factory (Todd 1963) and has been collected at Moar Bay (Fig. 1) on the east coast (Manning and Macpherson 1952).

Horned Lark, Eremophila alpestris

North Twin Island. Estimated population 1,500, perhaps higher during the spring migration. Breeds. Eleven hundred observations in 1973. First seen on 8 May and regularly thereafter. Females scarce until 20 May. Nest with 1 egg found on 17 June. First young, fledged, but unable to fly seen on 2 July; the first flying young on 4 July. In the latter half of September 1972, Horned Larks were the commonest passerine, and 415 were recorded in 25 h along the shore and 16 h inland (10 per h). In the first half of October, 94 were seen in 26 h along the shore and 5½ h inland (3 per h). In September, they were common inland on the tundra where the vegetation was short and dry, but they were more numerous near the shore, both at the edge of the tundra and on the sand. The piles of kelp at the mouth of 'Fish' Brook were favourite feeding places. Two were seen near the cabins on 16 October but it seems unlikely that many remained after that date. Common; adults and young collected (Todd 1963). Common (Jonkel and Knudsen MS). Forty recorded between 21 July and 3 August (Knudsen MS). Common (Baldwin MS).

South Twin Island. In 1970, common on the ridges, particularly those near the coast. Common; adults and young collected (Todd 1963). Probably the commonest passerine (Baldwin MS).

Subspecies. The 14 adults collected in 1973 are a good average match for specimens from the east side of James Bay and northern Québec. Their throat and facial yellow, particularly the latter, averages distinctly darker than that of eleven adults from Cape Henrietta Maria, which are nonetheless considered referable to E. a. alpestris (Manning 1952). No obvious migrant E. a. hoyti were seen either in 1972 or 1973.

Tree Swallow, Iridoprocne bicolor

North Twin Island. Rare (Jonkel and Knudsen MS). Tree Swallows have been recorded (Todd 1963) at Fort George (Fig. 1) and a nest found (Peck 1972) at radar site 415 (Fig. 1).

Barn Swallow, Hirundo rustica

North Twin Island. On 3 July 1973, a Barn Swallow, apparently feeding on insects above the cabins was seen clearly by Carter and myself. Recorded, probably nesting, at radar site 415 (Peck 1972).

Cliff Swallow, Petrochelidon pyrrhonota

North Twin Island. During a westerly gale accompanied by snow flurries on 22 September 1972, an exhausted Cliff Swallow attempted to land on or shelter behind the cabin, then flew inland. It was seen clearly and identified by Carter and myself. This is a northern record for the James Bay region. There are breeding records for Moose Factory (Todd 1963) and Moosonee (Schueler et al. 1974).

Common Raven, Corvus corax

North Twin Island. A raven was seen and heard on 10 and 11 May and 2 others on 19 May. A bird seen on 25 July may have been a raven or a crow. Rare (Jonkel and Knudsen MS). Recorded on 28 July (Knudsen MS).

Mockingbird, Mimus polyglottos

South Twin Island. Baldwin (MS) saw one at 5 m range on 25 July. This is a northern record for the James Bay region. There are records for Moose Factory (Todd 1963) and North Point (Manning MS) in southern James Bay.

Gray Catbird, Dumetella carolinensis

North Twin Island. Two were seen at 'The Forest' on 5 June 1973 and 1 on 6 June. The only previous record for the James Bay region is a single sighting at Moose Factory on 5 July 1951 (Todd 1963).

Brown Thrasher, Toxostoma rufum

North Twin Island. One was seen in some spruce above 'Mordor' Escarpment on 27 May 1973 and next day a male was collected in the willow thicket below it. Another was seen in this thicket on 30 May and on 9 and 25 June. On 6 June, 1 was seen at 'The Forest'. These are the first records for the James Bay area but vagrants have twice been recorded on the Belcher Islands (Manning 1976).

Subspecies. The small size of the male collected (wing 99 mm, tail 120 mm) like that of the Belcher Island specimen (Manning 1976), indicates the eastern race, T. r. rufum.

American Robin, Turdus migratorius

North Twin Island. Estimated population 25. Breeds. Sixty observations in 1973. First seen on 8 May. On 5 June, a nest with 3 eggs was found in a spruce tree at 'The Forest'.

On 7 June and 13 June, it contained 4 eggs and, on 29 June, 3 young, which left the nest when disturbed on 1 July. On 25 June, another nest with 4 eggs was found in the willow thicket below 'Mordor' Escarpment. On 5 July, it still contained 4 eggs but on 15 July only 3 young, about the same age as those at 'The Forest' on 29 June. A clutch of 4 eggs was still being incubated on 24 July (Jonkel and Knudsen MS). In 1972, I saw a robin on 25 September and Carter saw 2 on 7 October. Occasional (Jonkel and Knudsen MS). One seen on 28 July (Knudsen MS). Two seen on 16 and 1 on 17 July (Baldwin MS).

South Twin Island. On 5 August 1970 I saw an adult and on 7 August 1 young and 3 adults. Two seen on 26 July (Baldwin MS).

Subspecies. The single nestling collected is typical T. m. nigrideus; its back is dark and its breast heavily spotted. James Bay may mark the division between that race and T. m. migratorius (Manning 1952, Manning and Macpherson 1952) though Todd (1963) confined T. m. nigrideus to Newfoundland and the Labrador coast.

Hermit Thrush Catharus guttatus

North Twin Island. Seven seen in scattered spruce and willow between 10 and 31 May 1973.

Swainson's Thrush, Catharus ustulatus

North Twin Island. A male was collected at 'The Forest' on 6 June. Next day 7 were seen there and 3 in scattered spruce near the cabins. Some were not seen well enough to be distinguished from Grey-cheeked Thrushes, Catharus minimus.

Golden-crowned Kinglet, Regulus satrapa

North Twin Island. On 8 May 1973, Carter saw 1 or more with Ruby-crowned Kinglets in dwarf birch below 'Mordor' Escarpment. On 10 May, I collected a female in the same area. These appear to be northern records for the James Bay region, though there are several records for Churchill (Jehl and Smith 1970).

Ruby-crowned Kinglet, Regulus calendula

North Twin Island. Forty recorded, between 8 May and 6 June 1973, mostly in dwarf birch below 'Mordor' Escarpment and at 'The Forest'. The last was seen in the former area on 25 June.

Water Pipit, Anthus spinoletta

North Twin Island. Estimated population 600. Breeds. Two hundred and ten observations in 1973. First seen on 20 May. On 5 July a nest was found with 4 newly hatched young. Young just able to fly were seen on 11 and 21 July. In 1972, I saw 45 pipits in 25½ h along the shore and 12 h inland between 22 September and 3 October; most were on or near the shore. Recorded on 30 July (Todd 1963). Occasional (Jonkel and Knudsen MS). Twenty-five seen

between 21 July and 3 August (Knudsen MS). Seen occasionally (Baldwin MS).
South Twin Island. Common along the beach and seen feeding young on 25 July (Todd 1963).

Bohemian Waxwing, Bombycilla garrulus
North Twin Island. On 22 July 1973, Carter found a partly feathered skeleton on 'Guillemot' Island. The only previous James Bay record of this western species appears to be a specimen in the Smithsonian Institution from Moose Factory listed by Baird (1874).

Northern Shrike, Lanius excubitor
North Twin Island. One seen by Carter on 11 May 1973 and 1 by me in a tall patch of willow inhabited by Tree Sparrows, on 30 September 1972. Knudsen (MS) saw 1 on 1 August and Baldwin (MS) 1 on 27 July.
South Twin Island. Four seen between 1 and 7 August 1970.
Subspecies. The apparent gap between the breeding ranges of L. e. borealis and L. e. invictus (Godfrey 1966) may prove illusionary as a female with enlarged ova was taken at Moosonee on 26 May 1972 (Schueler et al. 1974) and a group of 5 young were seen by me on 23 June 1975 at North Point (Fig. 1).

Tennessee Warbler, Vermivora peregrina
North Twin Island. On 25 June 1973, 3 Tennessee Warblers were seen in the willow thicket below 'Mordor' Escarpment.

Orange-crowned Warbler, Vermivora celata
North Twin Island. Carter tentatively identified a female Orange-crowned Warbler on 25 May and 4 June 1973. The species occurs (Manning and Macpherson 1952) regularly on the east coast of James Bay north as far as Paul Bay (Fig. 1).

Yellow Warbler, Dendroica petechia
North Twin Island. A single Yellow Warbler was seen near the cabins on 19 June 1973 and 9 in the willow thicket below 'Mordor' Escarpment between 19 June and 23 July. At least 2 males and 2 females inhabited this thicket and may have nested there.

Yellow-rumped Warbler, Dendroica coronata
North Twin Island. A male was collected at 'The Forest' on 5 June 1973 and at least 1 male and 2 females were seen there next day. Two males were seen below 'Mordor' Escarpment on 25 June.

Blackpoll Warbler, Dendroica striata
North Twin Island. A male and female were collected at 'The Forest' on 5 June and another

male and female seen there next day.

Common Yellowthroat, Geothlypis trichas

North Twin Island. A male was collected at 'The Forest' on 6 June 1973. There are sight records for Moar and Paul Bays (Fig. 1) on the east coast of James Bay (Manning and Macpherson 1952), but none north of Fort Albany (Fig. 1) on the west coast. A mummified specimen was found on the Belcher Islands in 1971 (Manning 1976).

Hooded Warbler, Wilsonia citrina

North Twin Island. On 26 May 1973, Carter and I had several good views of a male in the willow thicket beside the cabins. This is the only record for the James Bay area.

Wilson's Warbler, Wilsonia pusilla

North Twin Island. Commonest of the warblers. Probably breeds. In 1973, 5 different individuals were seen at 'The Forest' between 4 and 6 June. Between 9 June and 7 July, 4 were seen in the willows below 'Mordor' Escarpment and 5 in other tall willow thickets. On 16 July, I watched the female of a pair carrying several different insects, presumably to its young.

Bobolink, Dolichonyx oryzivorus

North Twin Island. A male was collected on 4 June 1973. There are records for Moose Factory (Todd 1963).

Meadowlark, Sturnella sp.

North Twin Island. On 28 May 1973 I had a good view of a meadowlark on the tundra below 'Mordor' Escarpment, but it was not identified to species. The Western Meadowlark, S. neglecta, has been recorded at Moosonee and the Eastern Meadowlark, S. magna, at Eastmain (Todd 1963) and Attawapiskat (Schueler 1974).

Yellow-headed Blackbird, Xanthocephalus xanthocephalus

North Twin Island. A male was collected at 'The Forest' on 5 June 1973. The only other record of this western species in the James Bay region is a specimen in NMNS taken in the spring of 1920 at Rupert House (Fig. 1).

Red-winged Blackbird, Agelaius phoeniceus

North Twin Island. On 30 June 1973, a male and female were seen together on the west side of the island.

South Twin Island. A juvenile male recorded on 26 July (Baldwin MS).

Rusty Blackbird, Euphagus carolinus

North Twin Island. On 20 May 1973, a loose flock of about 20 were feeding amongst scattered willow in the marsh 1.5 km south of the cabins. They were gone next day, but there were 30 there on 24 May. One was seen on 22 and 25 May. In 1972, I collected a male on 2 September and a female on 30 September.

Common Grackle, Quiscalus quiscula

North Twin Island. A male collected near the cabins on 25 May is a northern record for the James Bay region. Common Grackles have previously been recorded at Moosonee (Todd 1963, Schueler et al. 1974) and Fort Albany (Schueler et al. 1974).

Purple Finch, Carpodacus purpureus

South Twin Island. Two were seen separately on 5 August 1970. The species has been recorded on Akimiski Island (Manning 1952), and near the south end of James Bay (Todd 1963) and at radar site 416 (Peck 1972).

Hoary Redpoll, Carduelis hornemanni

North Twin Island. Six were seen together and 1 separately on 21 May. Next day I saw another small flock and a flock of about 25. Some Common Redpolls C. flammea may have been included in the larger flock; indeed the single specimen collected from it is somewhat intermediate. There are several winter and early spring records for James Bay (Todd 1963) but the above seem to be the only ones for May. The nearest known breeding areas are Cape Churchill (Cooke et al. 1975) and Ungava Bay (Hildebrand 1950).

Subspecies. Wing chords of the 3 specimens (male 75.2 mm, females 70.1 and 71.9 mm) indicate the smaller race C. h. exilipes.

Common Redpoll, Carduelis flammea

North Twin Island. Carter saw two redpolls, probably this species, on 7 July 1973 and, during late June and July, frequently heard some flying overhead in the mist. On 10 October, I saw a single Common Redpoll near the cabins. Some seen on 31 July (Todd 1963).

South Twin Island. Common; specimens collected (Todd 1963).

White-winged Crossbill, Loxia leucoptera

North Twin Island. A lone male collected at 'The Forest' on 6 June 1973. On 26 June, a flock of 25 was seen in a spruce tree near the cabins and the same or similar flock in the same area next day.

Savannah Sparrow, Passerculus sandwichensis

North Twin Island. Estimated population 2,000. Breeds. Four hundred and twenty

observations in 1973. Not definitely identified until 20 May, but a few may have been present from 10 May onwards. First young, just able to fly, seen on 19 July. This was the only species regularly seen in the dwarf birch. In 1972, I saw 27 during 12½ h spent inland between 12 and 26 September. They were usually in dense dwarf birch and difficult to see. None seen along the shore. Common (Jonkel and Knudsen MS). Forty-five seen between 21 July and 3 August (Knudsen MS).

South Twin Island. Common in the dwarf willow and birch in 1970. Common in July (Todd 1963). Fledglings seen, 25 July (Baldwin MS).

Dark-eyed Junco, Junco hyemalis

North Twin Island. Thirty recorded between 8 May and 28 June 1973, usually in or near spruce clumps. None seen after 28 June.

Tree Sparrow, Spizella arborea

North Twin Island. Estimated population 1,500. Breeds. Four hundred observations in 1973. First seen 10 May. Usually found in or near willow thickets. Nest with 4 eggs found by Carter on 7 July. This is the southernmost definite breeding record for James Bay, though Tree Sparrows no doubt nest on South Twin Island and perhaps further south along the east James Bay coast. In 1972, I saw 37 in 11 h inland between 26 September and 8 October. They favoured the high willow and my failure to record any between 16 and 26 September was probably due to lack of observations in that habitat. None seen along the shore. Common (Jonkel and Knudsen MS). Twenty-three recorded between 21 July and 3 August (Knudsen MS).

South Twin Island. On 18 June 1949, I counted 50 during a 4 h walk (Manning and Coates 1952), but in 1970 I recorded only 1, probably because I did not visit the right habitats. Adults and young collected on 27 July and 3 August (Todd 1963).

White-crowned Sparrow, Zonotrichia leucophrys

North Twin Island. Estimated population 400. Probably breeds. One hundred and seventy observations in 1973. First definitely identified on 9 May. In May and early June, they were frequently seen in spruce clumps but, later, usually in willow thickets where they no doubt nested, though no nests were found or young seen. None seen in 1972. Apparently all had left before 16 September. Common (Jonkel and Knudsen MS). Twenty-six recorded between 26 July and 3 August (Knudsen MS).

South Twin Island. Not very common in 1970, usually seen near spruce clumps. Records for North and South Twin Islands have been reversed in Manning and Coates (1952).

White-throated Sparrow, Zonotrichia albicollis

North Twin Island. Seventeen seen between 18 and 21 May 1973 and 1 on 6 and 9 June. I

identified none in late June or July and heard no singing at any time. Baldwin (MS), however, heard 2 singing on 14 July, but did not see them.

Fox Sparrow, Passerella iliaca

North Twin Island. A male collected at 'The Forest' on 11 May.

Lincoln's Sparrow, Melospiza lincolnii

North Twin Island. A male collected at 'The Forest' on 7 June and another seen in the dwarf birch below 'Mordor' Escarpment on 9 June.

South Twin Island. One seen in a tall willow thicket on 18 July 1949 may have been nesting (Manning and Coates 1952).

Lapland Longspur, Calcarius lapponicus

North Twin Island. Estimated population 2,000. Breeds. Eight hundred and fifty observations in 1973. Probably seen on 8 May, but not definitely identified until 11 May. Numerous by 20 May. Nest with 4 eggs found on 27 June, another with 4 eggs on 28 June and 1 with 5 eggs on 2 July. A nest found on 6 July contained 4 young about three days old. First young able to fly were seen on 17 July. In 1972, I recorded 90 during 20½ h inland between 17 September and 10 October. They were seldom seen on the shore. Common (Todd 1963). Common (Jonkel and Knudsen MS). Five recorded between 25 July and 3 August (Knudsen MS).

South Twin Island. Common in 1970. Common (Todd 1963).

Subspecies. Manning (1976) has pointed out that the population occupying eastern Canada is darker than topotypical C. l. lapponicus and should be referred to C. l. subcalcaratus.

Smith's Longspur, Calcarius pictus

North Twin Island. Occasional (Jonkel and Knudsen MS). Four seen near the cabins on 1 September (Knudsen MS). This is an eastern record for the species in the James Bay area. They are known to nest in the Cape Henrietta Maria region (Peck 1972) and I collected one at North Point (Fig. 1) on 28 May 1975.

Snow Bunting, Plectrophenax nivalis

North Twin Island. An abundant spring and fall migrant. Four hundred and thirty recorded between 8 and 24 May. Apart from a flock of 60, flying north on 4 June, only 15 were seen after that, the last on 6 June. In 1972, a flock of 20 flew over the cabins on 19 September. They were not seen again until 25 September. Between that date and 30 September, 95 were recorded in 9½ h inland and 11 h along the shore (4.6 per h). In October, they were more plentiful and 375 were recorded in 5½ h inland and 51 h along the shore between 1 and 15 October (6.6 per h). They were still numerous around the cabins on 16 October. A favourite feeding area was at the mouth of 'Fish' Brook.

Table 2. List of specimens, with weight and fat grade, collected on North Twin Island in 1972 and 1973. Specimens with 6 figures in their catalogue number were collected in 1972, and are in the Royal Ontario Museum, Toronto; those with five figures were collected in 1973 and are in the National Museum of Natural Sciences, Ottawa. An asterisk after the weight denotes an egg in the oviduct.

Cat. No.	Date	Sex	Weight	Fat grade	Cat. No.	Date	Sex	Weight	Fat grade
Canada Goose, *Branta canadensis*									
68662	17 May	M	-	2	68661	17 May	M	3.5 kg	2
68805	25 May	M	3.6 kg	2	68654	30 May	M	-	2
68657	7 June	M	3.7 kg	2	68658	7 June	M	3.6 kg	2
68655	17 May	F	3.7 kg*	4	68660	17 May	F	3.3 kg	4
68656	30 May	F	3.0 kg	3	68659	7 June	F	2.3 kg	2
68663	6 July	(Downy) M	161 g	1	118503	5 Oct.	(Juv.) F	-	-
Black Duck, *Anas rubripes*									
68669	22 June	M	1.3 kg	3	118502	23 Sept.	M	-	-
Pintail, *Anas acuta*									
68673	27 June	(Downy) M	-	-	118500	19 Sept.	(Juv.) M	-	-
Green-winged Teal, *Anas crecca*									
68671	8 June	M	332 g	2	118506	22 Sept.	M	-	-
118509	22 June	M	-	-					
Lesser Scaup, *Aythya affinis*									
68666	26 May	M	658 g	2	68665	22 June	M	675 g	2
68834	25 May	F	802 g	4	68835	25 May	F	824 g	4
Oldsquaw, *Clangula hyemalis*									
68664	2 June	M	786 g	2	68667	2 June	F	713 g	2
68668	10 June	F	-	1	68672	10 July	(Downy) F?	25.8 g	-

Cat. No.	Date	Sex	Weight	Fat grade	Cat. No.	Date	Sex	Weight	Fat grade
White-winged Scoter, *Melanitta deglandi*									
68670	23 June	F	1.7 kg*	3					
Black Scoter, *Melanitta nigra*									
68836	19 May	M	-	-					
Red-breasted Merganser, *Mergus serrator*									
118501	Found dead	-	-	-					
Willow Ptarmigan, *Lagopus lagopus*									
68675	16 May	M	633.5 g	2	68679	25 May	M	650 g	5
68681	31 May	M	661 g	3	68674	7 June	M	632 g	2
68683	17 June	M	598 g	3	68684	25 June	M	609 g	2
68686	27 June	M	-	3	68688	1 July	M	606 g	2
68689	5 July	M	-	3	68691	19 July	M	658 g	2
68692	19 July	M	652 g	2	68694	20 July	M	631 g	2
68676	16 May	F	-	3	68677	19 May	F	672 g	5
68678	25 May	F	668 g	6	68680	31 May	F	691 g*	5
68682	6 June	F	-	3	68685	27 June	F	549 g	4
68693	19 July	F	572 g	2	68690	5 July	(Downy) M	-	-
68687	27 June	(Downy) M	15.0 g	-					
26 Willow Ptarmigan 118455-118480 were collected in 1972 but not weighed.									
Semipalmated Plover, *Charadrius semipalmatus*									
68696	15 July	(Downy) M	6.9 g	-	118508	25 Sept.	F	-	-
Killdeer, *Charadrius vociferus*									
68695	9 May	M	68.5 g	2					
American Golden Plover, *Pluvialis dominica*									
68697	25 July	F	156 g	5	118493	25 Sept.	F	-	-
Black-bellied Plover *Pluvialis squatarola*									
118492	18 Sept.	M	-	-					

Cat. No.	Date	Sex	Weight	Fat grade	Cat. No.	Date	Sex	Weight	Fat grade
Ruddy Turnstone, *Arenaria interpres*									
68699	7 June	-	-	5	118507	27 Sept.	F	-	-
Common Snipe, *Capella gallinago*									
68701	21 May	M	93.5 g	3	68703	7 July	(Downy)	41.0 g	-
Whimbrel, *Numenius phaeopus*									
68698	20 July	M	453 g	5					
Greater Yellowlegs, *Tringa melanoleuca*									
118494	21 Sept.	F	-	-					
Red Knot, *Calidris canutus*									
68700	20 July	F	135.4 g	4					
Purple Sandpiper, *Calidris maritima*									
68712	6 June	F	67.5 g	5	68713	25 July	(Downy) F?	24.9 g	-
White-rumped Sandpiper, *Calidris fuscicollis*									
118496	2 Oct.	F	-	-					
Least Sandpiper, *Calidris minutilla*									
68718	24 May	M	21.6 g	4	68719	12 June	M	22.2 g	4
68720	5 July	(Downy) F	4.7 g	-					
Dunlin, *Calidris alpina*									
68704	17 June	M	46.4 g	2	68705	17 June	M	50.2 g	2
68707	25 June	M	53.3 g	3	118495	20 Sept.	M	-	-
68706	22 June	F	54.5 g	4	68708	10 July	F	63.4 g	3
68709	10 July	F	53.5 g	3	68710	10 July	F	56.4 g	3
68711	10 July	F	58.4 g	3	68727	21 July	(juv.) M?	-	-

Cat. No.	Date	Sex	Weight	Fat grade	Cat. No.	Date	Sex	Weight	Fat grade
Semipalmated Sandpiper, *Calidris pusilla*									
68715	10 June	M	23.3 g	2	68717	12 June	M	23.7 g	3
68716	12 June	M	24.1 g	3	68714	30 May	F	33.5 g	5
118504	25 Sept.	F	-						
Sanderling, *Calidris alba*									
68722	17 July	M	65.6 g	5	68723	17 July	M	68.8 g	5
68724	17 July	M	60.6 g	5	68726	20 July	M	66.4 g	5
68721	21 May	F	62.5 g	3	68725	20 July	F	69.5 g	5
118505	27 Sept.	F?	-	-					
Short-billed Dowitcher, *Limnodromus griseus*									
68702	20 May	M	87.2 g	2	68728	24 June	(Downy) F?	11.9 g	-
Hudsonian Godwit, *Limosa haemastica*									
68806	21 July	F	319 g	5					
Northern Phalarope, *Lobipes lobatus*									
68729	19 June	F	41.4 g*	2	68730	9 July	(Downy)	4.5 g	-
Herring Gull, *Larus argentatus*									
68731	16 June	M	-	4	68732	28 June	(Downy)	-	-
Arctic Tern, *Sterna paradisaea*									
68733	24 June	M	-	3	68734	19 July	(Downy)	14.7 g	-
68735	19 July	(Downy)	14.5 g						
Black Guillemot, *Cepphus grylle*									
68736	23 June	M	-	2	68737	9 July	M	-	2
68738	2 July	(Downy) M	-	-					

Cat. No.	Date	Sex	Weight	Fat grade	Cat. No.	Date	Sex	Weight	Fat grade
Horned Lark, *Eremophila alpestris*									
68740	10 May	M	40.8 g	3	68739	11 May	M	44.2 g	4
68741	12 May	M	45.8 g	3	68742	13 May	M	32.8 g	2
68743	13 May	M	44.8 g	3	68744	14 May	M	37.0 g	2
68745	14 May	M	39.0 g	3	68746	15 May	M	37.8 g	3
68747	15 May	M	37.5 g	2	68750	18 June	M	38.2 g	3
68752	21 June	M	40.5 g	3	118485	13 Oct.	M	-	-
68748	28 May	F	-	3	68749	7 June	F	-	3
68751	18 June	F	42.3 g	4	118482	24 Sept.	F	-	-
118483	27 Sept.	F	-	-	118484	13 Oct.	F	-	-
Gray Catbird, *Dumetella carolinensis*									
68753	5 June	F	-	2					
Brown Thrasher, *Toxostoma rufum*									
68754	28 May	M	58.0 g	2					
American Robin, *Turdus migratorius*									
68755	1 July (nestling)	M	61.2	-					
Hermit Thrush, *Catharus guttatus*									
68758	10 May	F	28.1 g	2	68757	31 May	F	27.0 g	4
Swainson's Thrush, *Catharus ustulatus*									
68756	6 June	M	29.3 g	3					
Golden-crowned Kinglet, *Regulus satrapa*									
68759	10 May	F	5.3 g	3					
Ruby-crowned Kinglet, *Regulus calendula*									
68760	8 May	M	-	3	68761	7 May	M	6.8 g	3
68762	9 May	M	6.7 g	2	68763	9 May	M	7.4 g	4
68764	18 May	M	7.7 g	3					

Cat. No.	Date	Sex	Weight	Fat grade	Cat. No.	Date	Sex	Weight	Fat grade
Water Pipit, Anthus spinoletta									
118487	25 Sept.	M	-	-	118488	22 Sept	F	-	-
Bohemian Waxwing, Bombycilla garrulus									
Found dead									
Tennessee Warbler, Vermivora peregrina									
68765	25 June	F	10.8 g	3					
Yellow-rumped Warbler, Dendroica coronata									
68766	5 June	M	-	3					
Blackpoll Warbler, Dendroica striata									
68767	5 June	M	-	2	68768	5 June	F	-	3
Common Yellowthroat, Geothlypis trichas									
68769	6 June	M	9.8 g	2					
Wilson's Warbler, Wilsonia pusilla									
68770	4 June	F	9.0 g	2	68771	5 June	F	9.0 g	2
Bobolink, Dolichonyx oryzivorus									
68772	4 June	M	38. g	3					
Yellow-headed Blackbird, Xanthocephalus xanthocephalus									
68773	5 June	M	83 g	2					
Rusty Blackbird, Euphagus carolinus									
118491	22 Sept	M	-	-					
68774	20 May	F	-	3					
118490	30 Sept.	F?	-	-					
Common Grackle, Quiscalus quiscula									
68775	25 May	M	128 g	2					

Cat. No.	Date	Sex	Weight	Fat grade	Cat. No.	Date	Sex	Weight	Fat grade
Hoary Redpoll, *Carduelis hornemanni*									
68777	21 May	M	19 g	2	68776	21 May	F	12.9 g	2
68778	22 May	F	13.0 g	3					
White-winged Crossbill, *Loxia leucoptera*									
68779	6 June	M	23.1 g	2	68780	26 June	M	25.6 g	2
68781	27 June	M	24.3 g	2					
Savannah Sparrow, *Passerculus sandwichensis*									
68782	20 May	M	21.4 g	5	68783	27 May	M	19.0 g	3
68784	10 June	M	20.4 g	2	68787	19 June	M	21.2 g	3
68788	20 June	M	20.1 g	3	68789	20 June	M	22.0 g	3
68790	21 June	M	19.5 g	2	68791	21 June	M	21.7 g	2
68785	11 June	F	19.0 g	3	68786	19 June	F	23.5 g*	4
68792	24 June	F	19.8 g	2	118497	22 Sept.	M?	-	-
Dark-eyed Junco, *Junco hyemalis*									
68793	10 May	F	18.0 g	2					
Tree Sparrow, *Spizella arborea*									
68794	10 May	M	18.4 g	2	118498	27 Sept.	M?	-	-
118499	30 Sept.	?	-	-					
White-crowned Sparrow, *Zonotrichia leucophrys*									
68795	19 May	M	-	3					
White-throated Sparrow, *Zonotrichia albicollis*									
68796	19 May	M	26.6 g	3					
Fox Sparrow, *Passerella iliaca*									
68797	11 May	M	36.8 g	3					

Cat. No.	Date	Sex	Weight	Fat grade
Lincoln's Sparrow, *Melospiza lincolnii*				
68798	7 June	M	18.4 g	4
Lapland Longspur, *Calcarius lapponicus*				
68803	9 July	(juv.) M?	-	-
68800	29 May	F	18.9 g	2
68802	24 June	F	26.5 g	4
Snow Bunting, *Plectrophenax nivalis*				
118486	11 Oct	M	-	-
68799	29 May	F	25.1 g	3
68801	11 June	F	24.4 g	3
118489	27 Sept	F	-	-
68804	14 May	M	35.2 g	3

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